U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

May 2019

Miles City Field Office

Draft Supplemental Environmental Impact Statement and Resource Management Plan Amendment

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Miles City Field Office
111 Garryowen Road
Miles City, MT 59301
www.blm.gov/mt/

Dear Reader:

Enclosed is the Draft Supplemental Environmental Impact Statement (SEIS) and Resource Management Plan Amendment (RMPA) to the 2015 Miles City Field Office RMP. The Bureau of Land Management (BLM) prepared the Draft SEIS/RMPA in response to a United States District Court, District of Montana, opinion and order (*Western Organization of Resource Councils, et al. v. BLM*). The BLM developed the Draft SEIS/RMPA in consultation with various federal, state, local, and tribal governments.

The purpose of the Draft SEIS/RMPA is to provide additional analysis for land use planning specifically regarding coal, oil, and gas in the Miles City Field Office and to determine the lands to be made available for coal leasing. The need for action is to:

- Consider an alternative that would reduce the amount of recoverable coal and consider climate change impacts, in order to make a reasoned decision on the amount of recoverable coal made available
- Supplement the analysis of the environmental consequences of downstream combustion of coal, oil, and gas open to development
- Justify the time horizon of the estimated global warming potential impacts (e.g., 20-year or 100-year) and to acknowledge the evolving science in this area

The SEIS/RMPA would replace decisions for coal resource leasing availability in the 2015 Miles City Field Office RMP/Record of Decision.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the Draft SEIS/RMPA. We are interested in any new information that would help the BLM as it develops the Final SEIS/Proposed RMPA. As a member of the public, your timely comments on the Miles City Draft SEIS/RMPA will help formulate the Final SEIS/Proposed RMPA. The BLM will accept comments for ninety (90) calendar days following the Environmental Protection Agency's publication of its Notice of Availability in the *Federal Register*. The BLM can best use your comments and resource information submissions if received within the review period.

Electronic comments may only be submitted via the ePlanning website: https://go.usa.gov/xmbE4. You also may hand deliver hard copy comments during business hours (8:00 a.m. to 4:30 p.m.) or mail them to: Attention: Irma Nansel, Bureau of Land Management, Miles City Field Office, 111 Garryowen Road, Miles City, MT 59301. To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format.

Your review and comments on the content of this document are critical to the success of this planning effort. If you wish to submit comments on the Draft SEIS/RMPA, we request that you make your comments as specific as possible. Comments will be more helpful if they include suggested changes, sources, or methodologies, and reference to a section or page number. The BLM will consider and include comments containing only opinion or preferences as part of the decision-making process, although they will not receive a formal response from the BLM.

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public meetings to provide an overview of the document, respond to questions, and take public comments will be announced by local media, website, or public mailings at least 15 days in advance.

The BLM has sent copies of the Draft SEIS/RMPA to affected federal, state, tribal, and local government agencies. Copies are also available for public inspection at the following BLM locations and on the ePlanning website at https://go.usa.gov/xmbE4.

Bureau of Land Management
Montana State Office
5001 Southgate Drive
Billings, MT 59101

Bureau of Land Management
Miles City Field Office
111 Garryowen Road
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Thank you for your continued interest in the Miles City Draft SEIS/RMPA. We appreciate the information and suggestions you contribute to the planning process. For additional information or clarification regarding this document or the planning process, please contact Irma Nansel at (406) 233-3653.

Sincerely,

Eric D. Lepisto

Eric Lepisto
Miles City Office Field Manager, Acting
Bureau of Land Management

Draft Supplemental Environmental Impact Statement and Potential Resource Management Plan Amendment Miles City Field Office, Montana

Responsible Agency:	United States Department of the Interior Bureau of Land Management	
Type of Action:	Administrative (X)	Legislative ( )
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Abstract: This Draft Supplemental Environmental Impact Statement (SEIS) and Resource Management Plan Amendment (RMPA) augments analysis for the 2015 Miles City Field Office RMP. The SEIS updates the coal screens; analyzes two reduced coal alternatives; supplements analysis of coal, oil, and gas downstream emissions; and provides justification for the global warming potential analysis. The scope of the SEIS/RMPA is limited to amending coal leasing acceptability decisions from the 2015 RMP/Record of Decision (ROD). The RMPA would affect up to 1.7 million acres of subsurface federal coal estate in eastern Montana administered by the Bureau of Land Management (BLM) Miles City Field Office. The RMPA is limited to amending decisions regarding lands acceptable for further consideration for leasing from the 2015 RMP.

The BLM is the lead agency for the Draft SEIS/RMPA with eight cooperating agencies initially participating in the plan development. Planning issues address leasable minerals, greenhouse gases, climate change, socioeconomics, water resources, cultural resources, special status species, wildlife, and lands and realty. The SEIS/RMPA considers three alternatives.

Alternative A, the No Action Alternative, continues management decisions for coal leasing availability under the 2015 RMP/ROD. Alternative B would update management decisions for coal leasing availability under the 2015 RMP/ROD based on a revised coal screen not contemplated when the coal development potential area was defined under Alternative A. Alternative B removes areas as unacceptable for further consideration for leasing under a multiple-use screen that considers conflicts with oil and gas wells; oil and gas units; perennial, riparian, and wetland resources; conservation easements; recreation areas; sport fishing reservoirs; areas of critical environmental concern; and cultural viewsheds. Alternative C uses the coal screen described under Alternative B, but it applies an additional multiple-use consideration for greenhouse gases. Under this alternative, coal availability would be restricted to an 8-mile infrastructure area around four existing mines.

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ERRATA

In the Air Resources, Including Greenhouse Gases and Climate Change analysis for the Draft RMPA/SEIS, an oil conversion factor was mistyped, resulting in incorrect downstream greenhouse gas emissions. The annual average downstream greenhouse gas emissions from federal oil combustion in the MCFO were reported as 0.1 million metric tons per year, instead of 1.3 million metric tons per year. Additionally, the annual average downstream greenhouse gas emissions from nonfederal oil combustion in the MCFO were reported as 0.9 million metric tons per year, instead of 8.9 million metric tons per year. This discrepancy amounts to 1.5 percent of cumulative federal oil downstream greenhouse gas emissions and 10 percent of cumulative nonfederal oil downstream greenhouse gas emissions. Section 3.3 and Appendix B have been updated accordingly and are included with this errata sheet below. The only changes made in Section 3.3 and Appendix B are shown in gray shading below.

3.3 AIR RESOURCES, INCLUDING GREENHOUSE GASES AND CLIMATE CHANGE

The BLM air resources program includes air quality, air quality-related values such as visibility and deposition, and greenhouse gases and climate change. Because the management actions being evaluated in this SEIS/RMPA would not affect the air quality and air quality-related values analyses contained in the 2015 Proposed RMPA/Final EIS (BLM 2015a) and these were not the subject of the court order, the analysis here focuses on greenhouse gases and climate change.

3.3.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Climate – Affected Environment,* pages 3-2 through 3-4; and *Climate Change – Affected Environment*, page 3-4 through 3-12). More recent information as it pertains to the decisions for this SEIS/RMPA is included below.

The Intergovernmental Panel on Climate Change (IPCC) describes climate change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC 2013).

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC 2013). The global average surface temperature has increased approximately 1.5 degrees Fahrenheit (°F) from 1880 to 2012 (IPCC 2013). Warming has occurred on land surfaces, oceans, and other water bodies. It has also occurred in the troposphere, which is the lowest layer of the earth's atmosphere ranging from 4 to 12 miles above the surface within which all the weather phenomena we experience on a daily basis occur.

Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Although largely invisible to the short wavelength incoming solar radiation that heats the earth's surface, GHGs absorb a portion of the outgoing long wavelength infrared heat radiated back from the surface, preventing it from escaping out into space. As a result, the buildup of GHGs such as carbon dioxide, methane, and nitrous oxide since the start of the industrial revolution has increased the global mean temperature and begun to alter the earth's climate in complex ways.

This section analyzes the three main GHGs (carbon dioxide, nitrous oxide, and methane) associated with the production, transportation, and downstream combustion of coal, oil, and gas over the life of the SEIS/RMPA. The analysis responds to the GHG and climate change-related issues identified in the United States District Court, District of Montana, opinion and order (*Western Organization of Resource Councils, et al. v. BLM*) (see **Chapter 1**, Purpose and Need) and issues identified through scoping (see **Tables 1-1** and **1-2**). The court order requires the BLM to supplement the 2015 Proposed RMP/Final EIS analysis to evaluate the environmental consequences of the downstream combustion of coal, oil, and gas open to potential development

(claim #3), justify the use of global warming potential (GWP) time horizons, and explain the evolving science in this area (claim #5).

The method the BLM used to supplement the GHG and climate change analysis is described below. **Section 2.2**, Alternatives Development, addresses coal screening and consideration of climate change impacts, which the BLM used to make a reasoned decision on the amount of recoverable coal made available in the SEIS/RMPA (claim #1).

Different GHGs have different atmospheric lifetimes. Some, such as methane (CH_4), react in the atmosphere relatively quickly (on the order of 12 years; see EPA 2018a); others, such as carbon dioxide (CO_2), typically last for hundreds of years or longer. GHGs also vary with respect to the amount of outgoing radiation absorbed by each gas molecule relative to the amount of incoming radiation it allows to pass through (i.e., its level of radiative forcing). A molecule of nitrous oxide (N_2O) is far more effective at absorbing outgoing radiation than a molecule of CO_2. The impact of a given GHG species on global warming depends both on its radiative forcing and how long it lasts in the atmosphere.

Climate scientists have calculated a GWP for each GHG that accounts for these effects. GWPs are calculated for each GHG species for a specified time interval (typically 20 or 100 years). By definition, the GWP for CO_2 is assigned a value of 1, and GWPs for other gases are defined relative to CO_2. In technical terms, GWP is the time-integrated direct (and potentially indirect) radiative forcing of an amount of a GHG species released instantaneously into the atmosphere relative to that of an equal amount of CO_2.

GWP values allow for an "apples-to-apples" comparison of the impacts of emissions of different GHGs. In particular, emissions of mixtures of different GHGs are typically summarized in terms of their CO_2 equivalent (CO_2e) emissions defined as the weighted sum of the emissions of each GHG where the weights are the GWPs. For example, emissions of the three most significant GHGs associated with fossil fuel combustion (CO_2, CH_4, and N_2O) are summarized as

$$CO_2e(MMT/year) = CO_2(MMT/year) + GWP_{CH4} \times CH_4(MMT/year) + GWP_{N2O} \times N_2O(MMT/year)$$

where MMT stands for million metric tons per year.

Because the GWP of a given GHG depends in part on the atmospheric lifetime of the GHG, GWP values depend on the time interval for which they are estimated. The GWP for a relatively short-lived GHG, such as CH_4, is larger over a short time period (for example, 20 years) as compared with a much longer time period (such as 100 years) because most of the CH_4 will have reacted away well before 100 years have passed. Conversely, very long-lived GHGs have a 20-year GWP that is lower than the 100-year GWP because the time integrated radiative forcing is less (relative to CO_2) over the shorter time interval.

As a result of various complex feedbacks in the earth-atmosphere system, GWPs can only be roughly estimated; according to the IPCC, GWPs typically have an uncertainty of ±35 percent (IPCC 2013). Estimates of GWPs have been updated over the years as the models used to calculate them have been refined and to reflect the changing composition of the atmosphere that

impacts the GWP of each additional ton of GHG emissions. GWPs have been calculated for several GHGs over different time horizons, including 20 years, 100 years, and 500 years. The choice of time horizon depends on the type of application and policy context; hence, no single time horizon is optimal for all policy goals. The United Nations Framework Convention on Climate Change and its Kyoto Protocol[1] adopted the 100-year GWP, and it is used widely as the default measure. For example, the EPA uses the 100-year time horizon in its annual GHG inventories. The EPA's most recent inventory (EPA 2019a) uses 100-year GWPs consistent with the IPCC Fifth Assessment Report (IPCC 2013).

This SEIS/RMPA reports CO_2e emissions using GWPs for the 100-year time horizon for consistency with the EPA's inventory as well as GWPs for the 20-year time horizon to more clearly estimate the relative impacts of shorter-lived GHGs (i.e., CH_4) over the 20-year life of the SEIS/RMPA. More information on specific GWPs and time horizons used for this analysis are provided in the section below on *Direct and Indirect Impacts*, *Analysis Methods*.

Physical Manifestations of Climate Change

Warming of the earth's climate since the industrial revolution has been observed to coincide with widespread effects throughout the earth-atmosphere system, including reductions in the extent and duration of polar sea ice and mountain winter snowpack, rising sea levels, increases in mean nighttime minimum temperatures, shifts in historical rainfall patterns, and changes in the frequency, severity, and duration of weather events. These effects, in turn, have affected natural and human systems regardless of cause, implicating the sensitivity of natural and human systems to changing climate (IPCC 2013).

Changes in climate and the potential effects of climate change were described in the 2015 Proposed RMP/Final EIS (pages 3-2 to 3-10). Since that time, the Fourth National Climate Assessment (NCA) was published in November 2018. It was written to help inform decision-makers, utility and natural resource managers, public health officials, emergency planners, and other stakeholders by providing a thorough examination of the effects of climate change in the United States (US Global Change Research Program 2018). The National Oceanic and Atmospheric Administration summarizes some of the key findings of the report by stating that the US is increasingly vulnerable to climate change. It further states that while societal responses to climate change have expanded, they are not yet at the scale needed to avoid substantial impacts (NOAA 2018). Compared with previous reports, the NCA provides greater detail on regional scales as impacts and adaptation tend to be realized at a more local level.

As reported in the NCA, climate model projections show a warmer future in the Northern Great Plains (Montana, Wyoming, North Dakota, South Dakota, and Nebraska) with conditions becoming consistently warmer in 2 to 3 decades and temperatures rising steadily toward the middle of this century, irrespective of the climate scenario modeled. The NCA relies on recent climate modeling scenarios developed by the integrated assessment modeling community, known as the Representative Concentration Pathways (RCP). The "lower scenario" assumes lower emissions and concentrations of GHGs and aerosols, and projects a lower change in radiative

[1] https://unfccc.int

forcing by 2100. The "higher scenario" assumes a continued dependence on fossil fuels and higher GHG emissions and concentrations; it projects a larger change in radiative forcing by 2100.

For the Northern Great Plains, the NCA reports that temperature increases of 2° to 4°F projected by 2050 under the lower scenario are expected to increase the occurrence of both drought and heat waves; these projected trends would be greater under the higher scenario. The probability for more very hot days (those with maximum temperatures above 90°F) is expected to increase. There are projected to be many fewer cool days (those with minimum temperatures less than 28°F), with decreases of 30 days or more per year by mid-century.

The amount, distribution, and variability of annual precipitation are anticipated to change, with increases in winter and spring precipitation of 10 to 30 percent by the end of this century and a decrease in the amount of precipitation falling as snow under a higher scenario. Summer precipitation is expected to vary across the Northern Great Plains, ranging from no change under a lower scenario to 10 to 20 percent reductions under a higher scenario. Further, the frequency of heavy precipitation events is projected to increase, with an increase of about 50 percent in the frequency of 2-day heavy rainfall events by 2050 under the higher scenario. The amount falling in single-day heavy events is projected to increase 8 to 10 percent by mid-century depending on the scenario. While there is high confidence in future increases in temperature, uncertainties exist as to the degree of precipitation variability from year to year and within season (Conant et al. 2018).

The 2017 Montana Climate Assessment (Whitlock et al. 2017) is a report providing information on present-day climate as well as climate terminology, past climate trends, and future climate projections within Montana. Major findings from this report include:

- Annual average temperatures, including daily minimums, maximums, and averages, have risen across the state between 1950 and 2015. The increases range between 2.0 and 3.0°F.
- Average winter precipitation decreased by 0.9 inches, which can largely be attributed to natural variability and an increase in El Niño events, especially in the western and central parts of the state. A significant increase in spring precipitation (1.3 to 2.0 inches) also occurred during this period for the eastern part of the state.
- Montana is projected to continue to warm in all geographic locations, seasons, and under all emission scenarios throughout the twenty-first century. By mid-century, Montana temperatures are projected to increase by approximately 4.5 to 6.0°F.

GHG emissions are reported at a number of spatial scales, including globally, nationally, and at the state level. In addition to these scales,[2] GHG emissions from fossil fuels produced on federal lands and emissions reported in the three planning area counties are described below. A comparison of GHG emissions at differing scales provides context against which to compare emissions from a specific action, such as that being evaluated in this SEIS/RMPA.

The US Geological Survey (USGS) recently published a report on GHG emissions from extraction and use of fossil fuels produced on federal lands and GHG sinks (carbon storage by terrestrial

[2] See *Direct and Indirect Impacts*, *Analysis Methods* for the emission scales used for this analysis.

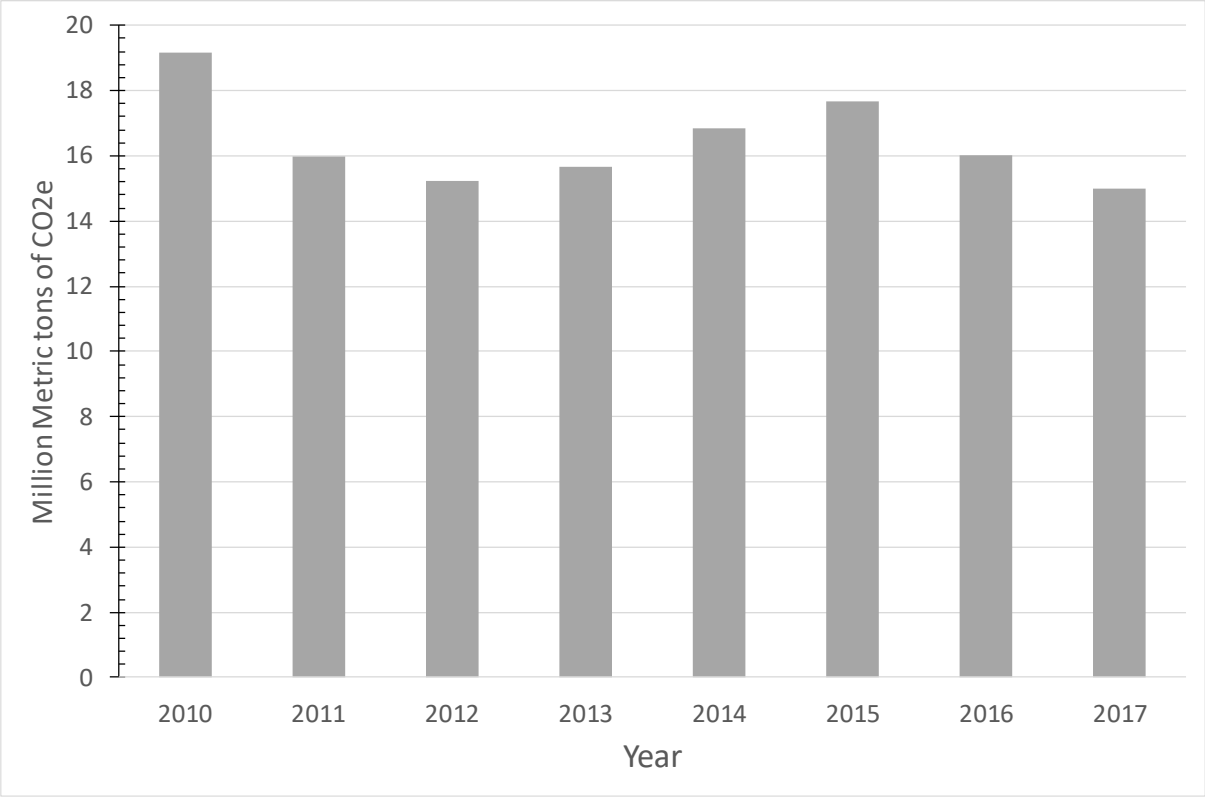
ecosystems) on federal lands in the US (USGS 2018). In 2014, nationwide emissions from fossil fuels (oil, gas, and coal) extracted from federal lands were 1,279.0 million metric tons (MMT) carbon dioxide equivalents (CO_2e) of carbon dioxide, 47.6 MMT CO_2e of methane, and 5.5 MMT CO_2e of nitrous oxide based on 100-year GWPs. GHG emissions from production and combustion of fossil fuels produced on federal lands in Montana were 42.1 MMT CO_2e of carbon dioxide (3 percent of total carbon dioxide emissions from all states and offshore areas combined) and 1.2 MMT CO_2e of methane (3 percent of total methane emissions from all states and offshore areas combined) (USGS 2018).

In 2014, carbon storage by terrestrial ecosystems on federal lands in the conterminous United States (not including Alaska and Hawaii) was 83,600 MMT CO_2e. Soils stored 63 percent of carbon, with vegetation and dead organic matter storing 26 percent and 11 percent, respectively. Between 2005 and 2014, the annual rate of net carbon uptake by terrestrial ecosystems in the conterminous US ranged from a sink (sequestration) of 475 MMT tons of CO_2e per year to a source (emission) of 51 MMT CO_2e per year. This was due to changes in climate/weather, land use, land cover change, wild fire frequency, and other factors. Terrestrial ecosystems on federal lands sequestered an average of 195 MMT CO_2e per year nationally between 2005 and 2014. In Montana, the annual average sequestration over the 10-year period was 19 MMT CO_2e per year, while emissions from wildfires averaged 1 to 2 MMT CO_2e per year. The 2014 net emission of GHGs for federal lands in Montana was 20.2 MMT CO_2e per year, indicating that more GHGs were emitted than were sequestered.

The EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT; EPA 2018a) database reports annual GHG emissions from facilities emitting more than 25,000 metric tons of CO_2e per year that are subject to the EPA's Greenhouse Gas Reporting Program (GHGRP) under 40 CFR 98. This includes emissions from most large, stationary sources of GHGs (smaller emitters are not required to report) and emissions from most end uses of fossil fuels. Nationally, the GHGRP accounts for 85 to 90 percent of total GHG emissions accounted for in the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks.[3] While CH_4 emissions from underground coal mines are included in the GHGRP, emissions from coal strip mines are not. GHG emissions reported under GHGRP by facilities in the 17 counties in the MCFO planning area for 2010–2017 are shown in **Diagram 3-1**. Total emissions in the 8-year period from 2010 to 2017 are the lowest in 2017.

[3] https://www3.epa.gov/climatechange/ghgemissions/inventoryexplorer/data_explorer_flight.html

Diagram 3-1. GHG Emissions in the 17 Planning Area Counties of the Miles City Field Office



Source: EPA 2018a

3.3.2 Direct and Indirect Impacts

Analysis Methods

This section analyzes the three main GHGs (carbon dioxide, nitrous oxide, and methane) associated with the production, transportation, and downstream combustion of coal, oil, and gas over the life of the SEIS/RMPA. The analysis responds to the GHG- and climate change-related issues identified in the United States District Court, District of Montana, opinion and order (*Western Organization of Resource Councils, et al. v. BLM*) and issues identified through scoping. Details of the methodology used to supplement the GHG and climate change analysis in response to the court's decision for coal, oil, and gas resources are described below. As noted above, coal screening and consideration of climate change impacts to make a reasoned decision on the amount of recoverable coal made available in the SEIS/RMPA (claim #1) are addressed in **Section 2.2**, Alternatives Development.

Coal

Emissions of GHGs are quantified for the estimated future production, transportation, and downstream combustion of federal coal developed within the planning area over the life of the plan. GHG emissions for coal production on federal lands are calculated from the emissions factors for coal mining equipment reported in the 2015 Proposed RMP/Final EIS (BLM 2015a) and

the BLM RFD scenario forecast for 2019 through 2038 (**Appendix C**).[4] In particular, the federal emissions estimates on a unit-production basis (ton/ton of coal production) from the 2015 Proposed RMP/Final EIS Air Resources Technical Support Document for CO_2, CH_4, and N_2O were used along with the current RFD to estimate production equipment GHG emissions for each year during the 2019–2038 planning period. The RFD forecast prepared by the BLM included federal and nonfederal annual coal production for each of the five mines in the planning area. Methane emissions from coal off gassing were calculated using the default emissions factor for surface mines in EPA's *State Inventory and Projection Tool*[5] for Montana and the RFD coal production forecasts.

The BLM estimated transportation emissions for the transport of produced coal via rail using diesel locomotives in areas that do not have "mine-to-mouth" operations. The BLM assumed an average one-way train haul distance of 1,500 miles and calculated emissions using the RFD-predicted annual tons of coal. The BLM conservatively based average train haul distance in miles on the farthest distance that coal would be transported by rail from any of the three mines (Absaloka, Decker, and Spring Creek) and determined from an internet search of railway miles from the Burlington Northern Santa Fe by the BLM MCFO. The BLM based emissions calculations on emission factors developed using data from the Burlington Northern Santa Fe Railway and EPA.

Burlington Northern Santa Fe developed a fuel efficiency factor for diesel locomotives of 849 ton-miles per gallon in its 2017 Corporate Responsibility and Sustainability Report (Burlington Northern Santa Fe 2017). The EPA provided emission factors for diesel locomotives of 20.9 pounds per gallon for CO_2, 0.0018 pounds per gallon for CH_4, and 0.0006 pounds per gallon for N_2O as presented in the Greenhouse Gas Inventory Guidance, Direct Emissions from Mobile Combustion Sources, January 2016 (EPA 2016). To account for the reduced load on the return trip when the coal cars are typically empty, the BLM estimated fuel consumption at 21.8 percent of the outbound (loaded) fuel consumption based on the ratio of the total weight of the unloaded train to that of the loaded train (American Association of Railroads 2018; Burlington Northern Santa Fe 2019).

Downstream emissions from federal and nonfederal coal combustion are determined using GHG emissions factors for stationary combustion of sub-bituminous coal from the EPA Emission Factors for Greenhouse Gas Inventories, March 2018 (EPA 2018b). The emission factor for sub-bituminous coal was used because more than 99 percent of coal produced within the planning area is sub-bituminous. The emission factors used for CO_2, CH_4, and N_2O are 1,676 kilograms per short ton, 190 kilograms per short ton, and 28 kilograms per short ton, respectively.

The GHG emissions for production, transportation, and combustion are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). This is because the same RFD was used in all three alternatives. GHG emissions are adjusted to use GWP values based on both 20- and 100-year time horizons to calculate carbon dioxide equivalents (see **Table 3-1** for a description of the GWPs and scientific relevance of these two time horizons).

[4] In the 2015 Proposed RMP/Final EIS, CH_4 emissions from coal production were estimated as 0.0006 percent of engine CO_2 emissions; N_2O emissions were estimated as 0.001 percent of engine CO_2 emissions (*Air Resource Technical Support Document [ARTSD] for Emission Inventories, Near-Field Modeling, and Visibility Screening*, p. A-79).
[5] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

The BLM selected 100-year GWPs so that emissions reported here can be directly compared with emission inventories compiled by the EPA (EPA, 2019a), which use these same GWPs, and to evaluate the relative long-term effect of emissions. The BLM selected 20-year GWPs to better evaluate near-term impacts of methane emissions over the life of the RMP CO_2 (see discussion under *Affected Environment* above). GWPs for other time horizons are not readily available and are not commonly used in the climate change community. Other emissions weighting metrics, such as the global temperature change potential (IPCC 2013) are not commonly used for reporting GHG emissions. Evaluations of the relative importance of emissions of short-lived GHG species relative to CO_2 are sensitive to the particular metric used, which should be carefully selected to match the specific policy question being addressed.

Table 3-1
GWPs for 100-Year and 20-Year Time Horizons and Rationale

Time Horizon	GWP[1]			Rationale for Time Horizon
	CO_2	CH_4	N_2O	
100-Year	1	28	265	Adopted by the United Nations Framework Convention on Climate Change and its Kyoto Protocol and used widely as the default metric; used by the EPA in its GHG Inventories and GHG Reporting Rule requirements under 40 CFR 98(A); consistent with the IPCC Fifth Assessment Report in its science communications.
20-Year	1	84	264	Prioritizes gases with shorter lifetimes, such as CH_4, because it does not consider impacts that happen more than 20 years after the emissions occur. Because all GWPs are calculated relative to CO_2, GWPs based on a shorter time frame will be larger for gases with lifetimes shorter than that of CO_2, and smaller for gases with lifetimes longer than CO_2.

Source: [1]IPCC 2014

The state, national, and global emission totals of GHGs (see **Table 3-2**) are compared with the potential direct and indirect impacts of coal mining on federal lands in the MCFO. A comparison with other metrics is provided for additional context.

Table 3-2
GHG Emissions (CO_2e) at Various Scales

Scale	Emissions	Source
Montana	20.1 million metric tons/year (2017)	EPA 2018a
National	6,457 million metric tons/year (2017)	EPA 2019a
Global	52 gigatons/year (2010)	IPCC 2014

Oil and Gas

GHG emissions are quantified for production and downstream combustion of oil, conventional natural gas, and coalbed natural gas (CBNG). The annual production estimates for 2019 to 2030 are the same as the fluid minerals production forecast under Alternative E in the 2015 Proposed RMP/Final EIS (BLM 2015a). GWP values that reflect 20- and 100-year time horizons (see **Table 3-1**) are used to obtain CO_2e emissions.

Annual oil and gas production forecast estimates are also used to form the basis of the emissions estimates for downstream combustion of oil and gas. Oil and gas combustion emissions are quantified using the EPA GHG emission factors for stationary source combustion of No. 2 fuel oil and natural gas, respectively. GHG emissions due to transportation of oil and gas from the planning area are qualitatively discussed.

The GHG emissions quantified for production and combustion are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). This is because the same RFD is used in all three alternatives. GHG emissions are reported using both 100-year and 20-year GWPs for reasons noted in the above discussion of coal. State, national, and global emission totals of GHGs from the EPA FLIGHT data (EPA 2018a), the EIA 2019 Annual Energy Outlook (EIA 2019), and the IPCC Fifth Assessment Report (IPCC 2014) are reported for comparison with the potential direct and indirect impacts of oil and gas development and production from federal minerals within the MCFO planning area (see **Table 3-2**). A comparison with other metrics is provided for additional context.

Assumptions

- The BLM prepared the RFD forecast for 2019 through 2038 (**Appendix C**), which includes federal and nonfederal annual coal production forecasts within the planning area. It was used to estimate annual emissions from coal production, transportation, and downstream combustion.
- On average over the 2019– 038 RFD forecast period, 83 percent of coal from mines in the planning area would be transported by diesel rail locomotives over an average distance of 1,500 miles one way. The BLM conservatively based the distance on the farthest distance that coal would be transported by rail from any of the planning area mines; this was determined by the BLM MCFO from a Burlington Northern Santa Fe Railway miles internet search. Fuel consumption to return empty coal railcars is 21.8 percent of the outbound loaded fuel consumption.
- All future coal produced is combusted in US energy generating units.
- Oil and gas production rates were based on year 20 producing-well counts and average per well production that were used to estimate production GHG emissions in the 2015 Proposed RMP/Final EIS, Alternative E (BLM 2015a).

Indicators

- MMT of CO_2, CH_4, and N_2O and the resulting CO_2e from coal production, transportation, and downstream combustion over the life of the RMP
- MMT of CO_2, CH_4, and N_2O and resulting CO_2e from oil and gas production, and downstream combustion over the life of the RMP
- GHG emissions from coal, oil, and gas as a percentage of state, national, and global emissions and other metrics
- GHG emission equivalencies from power plants and wind turbines

Impacts Common to all Alternatives

Coal

Table 3-3 summarizes GHG emissions from federal coal production, transportation, and downstream combustion for each forecast year. The details by pollutant (CO_2, CH_4, and N_2O) are shown in **Appendix B**.

Table 3-3
GHG Emissions as CO_2e from Federal Coal Production, Transportation, and Combustion based on 20-year and 100-year GWPs

Year	Federal RFD Coal Production (MMst)	CO_2e (MMT, 20-year GWP)				CO_2e (MMT, 100-year GWP)			
		Production (MMT)	Transportation (MMT)	Combustion (MMT)	Total (MMT)	Production (MMT)	Transportation (MMT)	Combustion (MMT)	Total (MMT)
2019	18.48	1.40	0.18	31.40	32.98	0.49	0.18	31.21	31.88
2020	25.44	1.92	0.28	43.23	45.43	0.67	0.28	42.96	43.91
2021	25.26	1.91	0.28	42.93	45.12	0.67	0.28	42.67	43.61
2022	24.60	1.86	0.28	41.80	43.94	0.65	0.28	41.54	42.47
2023	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2024	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2025	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2026	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2027	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2028	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2029	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2030	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2031	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2032	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2033	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2034	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2035	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2036	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2037	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2038	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
Total	**345.76**	**33.93**	**5.12**	**762.73**	**801.78**	**11.82**	**5.10**	**757.96**	**774.88**
Average	**22.07**	**1.70**	**0.26**	**38.14**	**40.09**	**0.59**	**0.25**	**37.90**	**38.74**

RFD: Reasonable Foreseeable Development
MMst: million short tons
MMT: million metric tons

The GHG emissions discussed above would contribute incrementally to global climate change. The lack of precise scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change at local scales limits the ability to quantify accurately the potential future impacts of climate change in the planning area. Furthermore, potential impacts on climate change

are influenced by GHG emission sources from around the world; it is not possible to accurately distinguish the impacts on global climate change from GHG emissions originating just from the planning area. Instead, the GHG emissions due to the federal action are compared with state, national, and global GHG emissions along with other metrics.

Total GHG emissions from federal coal production, transportation, and downstream combustion shown in **Table 3-3,** over the 20-year RMP lifetime, based on 20-year and 100-year GWPs are 802 MMT CO_2e and 775 MMT, respectively. The downstream combustion portion is 763 MMT and 758 MMT, respectively.

Average annual GHG emissions from federal coal production within the planning area, shown in **Table 3-3,** are 1.7 MMT CO_2e and 0.59 MMT CO_2e for 20-year and 100-year GWPs, respectively. These represent 8.5 percent and 2.9 percent, respectively, of the 20.1 MMT CO_2e total Montana GHG emissions for major facilities in 2017 as reported in the EPA FLIGHT data (EPA 2018a).

Average annual GHG emissions from federal coal production, transportation, and downstream combustion, shown in **Table 3-3**, are 40.1 MMT CO_2e and 38.7 MMT CO_2e for 20-year and 100-year GWPs, respectively. When compared with US GHG emissions, these represent 0.62 percent and 0.60 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (EPA 2019a). When compared with worldwide GHG emissions, these represent 0.08 percent and 0.07 percent, respectively, of the 52 gigatons total 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions due to production, transportation, and downstream combustion of coal forecast to be produced in the MCFO (using the 100-year GWP) are equivalent to the following, based on the EPA Greenhouse Gas Equivalencies Calculator (EPA 2019b):

- GHG emissions from 10 coal-fired power plants in one year
- GHG emissions avoided by 8,209 wind turbines running for one year

The corresponding numbers based on the 20-year GWP are 10 coal-fired power plants and 8,495 wind turbines.

Oil and Gas

Tables 3-4, **3-5**, and **3-6** summarize GHG emissions from the production and downstream combustion of federal oil, conventional natural gas, and coalbed natural gas, respectively. The details by pollutant (CO_2, CH_4, and N_2O) are shown in **Appendix B**. Oil and gas production estimates are identical in each year because they are based on the year 20 producing-well counts and average per well production in the 2015 Proposed RMP/Final EIS; the production is estimated from the product of these two quantities. This is likely a conservatively high estimate of annual production because the number of producing wells will be somewhat lower during the first few years.

Table 3-4
GHG Emissions as CO_2e from Federal Oil Production and Combustion based on 20-year and 100-year GWPs

Year[a]	Federal RFD Oil Production Rate (MMBO[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2020	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2021	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2022	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2023	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2024	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2025	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2026	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2027	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2028	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2029	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2030	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2031	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2032	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2033	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2034	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2035	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2036	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2037	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
2038	3.0	77,624	1,312,474	1,390,099	62,600	1,309,549	1,372,149
Total	**60.0**	**1,552,488**	26,249,489	27,801,977	**1,252,003**	26,190,983	27,442,986
Average	**3.0**	**77,624**	1,312,474	1,390,099	**62,600**	1,309,549	1,372,149

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Million barrels of oil

GHG emissions of CO_2, CH_4, and N_2O also would result from transportation of oil and gas from the planning area by pipeline, rail, or tanker truck. However, the BLM does not have readily available data on how the transport of liquid and gaseous fossil fuels are distributed among the forms of transportation (pipeline, rail, and tanker truck), or the quantity distributed to each type, in order to quantify emissions that would be representative of actual or reasonably foreseeable future operations. These GHG emissions attributable to the transport of oil and gas produced from the planning area would occur in the form of CO_2, CH_4, and N_2O.

The BLM has estimated GHG emissions attributable to the end use of the produced liquid and gaseous fossil fuels by assuming that 100 percent is combusted for heat or energy production. Although the actual end use of these products also may include transportation fuels; feedstocks

for plastics, chemical, and synthetic materials production; or other manufacturing, it is reasonably foreseeable to estimate emissions from combustion.

As in the case of coal production, the GHG emissions discussed above due to oil and gas production and combustion would contribute incrementally to global climate change, although at a much lower level relative to the coal production, transportation, and combustion. As noted previously, the lack of precise scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change at local scales limits the ability to accurately quantify the future impacts on climate change in the planning area. Furthermore, potential impacts on climate change are influenced by GHG emission sources from around the world; it is not possible to accurately distinguish the impacts on global climate change from GHG emissions originating from just the planning area. Instead, the GHG emissions due to the federal action are compared with state, national, and global GHG emissions, along with other metrics.

Total GHG emissions from federal oil production and downstream combustion (see **Table 3-4**) over the 20-year RMP lifetime are based on 20-year and 100-year GWPs. They are 27.8 MMT CO_2e and 27.4 MMT, respectively. Downstream combustion contributes 26.2 MMT and 26.2 MMT, respectively.

The average annual production emissions in the planning area are based on 20-year and 100-year GWPs. They represent 0.4 percent and 0.3 percent, respectively, of the 20.1 MMT total Montana GHG emissions in CO_2e for major facilities in 2017, as reported in the EPA FLIGHT data (EPA 2018a).

Average annual GHG emissions from the production and downstream combustion of federal oil produced in the MCFO (see **Table 3-4**) are 1,390,099 metric tons CO_2e and 1,372,149 metric tons CO_2e using 20-year and 100-year GWPs, respectively. When compared with US GHG emissions, these represent 0.02 percent and 0.02 percent, respectively, of the 6,457 MMT CO2e total 2017 US GHG emissions reported by the EPA (2019a). When compared with worldwide GHG emissions, these represent 0.0027 percent and 0.0026 percent, respectively, of the 52-gigaton 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions reported above using the 100-year GWP are equivalent to the following based on the EPA Greenhouse Gas Equivalencies Calculator (EPA 2019b):

- 0.35 coal-fired power plant GHG emissions in one year (i.e., one power plant running for 128 days)
- GHG emissions avoided by 291 wind turbines running for one year

The corresponding numbers, based on the 20-year GWP, are 0.337 coal-fired power plant GHG emissions (i.e., one power plant running for 123 days) and 278 wind turbines.

Total GHG emissions from federal natural gas production and downstream combustion (total of conventional natural gas and CBNG production and combustion) are shown in **Tables 3-5** and **3-6** over the 20-year RMP lifetime. They are based on 20-year and 100-year GWPs and are 15.3 MMT CO_2e and 15.1 MMT CO_2e, respectively. Downstream combustion represents 14.3 MMT CO_2e and 14.3 MMT CO_2e, respectively.

Table 3-5
GHG Emissions as CO_2e from Federal Conventional Natural Gas Production and Combustion, Based on 20-year and 100-year GWPs

Year[a]	Federal RFD Natural Gas Production (BCF[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2020	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2021	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2022	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2023	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2024	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2025	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2026	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2027	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2028	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2029	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2030	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2031	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2032	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2033	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2034	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2035	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2036	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2037	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2038	5.1	23,832	278,765	302,598	19,528	278,471	297,999
Total	**102.0**	**476,648**	**5,575,308**	**6,051,956**	**390,550**	**5,569,424**	**5,959,974**
Average	**5.1**	**23,832**	**278,765**	**302,598**	**19,528**	**278,471**	**297,999**

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Billion cubic feet

Table 3-6
GHG Emissions as CO_2e from Federal Coalbed Natural Gas Production and Combustion, Based on 20-year and 100-year GWPs

Year[a]	Federal RFD Natural Gas Production (BCF[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2020	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2021	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2022	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2023	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2024	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2025	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2026	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2027	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2028	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2029	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2030	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2031	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2032	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2033	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2034	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2035	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2036	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2037	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2038	8.0	25,289	435,471	460,761	19,765	435,012	454,777
Total	**160.0**	**505,789**	**8,709,428**	**9,215,217**	**395,295**	**8,700,236**	**9,095,530**
Average	**8.0**	**25,289**	**435,471**	**460,761**	**19,765**	**435,012**	**454,777**

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Billion cubic feet

The average annual production emissions in the planning area based on 20-year and 100-year GWPs represent 0.2 percent and 0.2 percent, respectively, of the 20.1 MMT CO_2e total Montana GHG emissions for major facilities in 2017, as reported in the EPA FLIGHT data (EPA 2018a).

The average annual GHG emissions from federal natural gas production and downstream combustion (total of conventional natural gas and CBNG production and combustion) are shown in **Tables 3-5** and **3-6**. They are 0.76 MMT CO_2e and 0.75 MMT CO_2e using 20-year and 100-year GWPs, respectively. These values represent 0.012 percent and 0.012 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (2019a).

The average annual GHG emissions combined from production and downstream combustion of federal oil and gas developed in the MCFO (**Tables 3-4** to **3-6**) are 2.2 MMT CO_2e and 2.1 MMT CO_2e using 20-year and 100-year GWPs, respectively. When compared with US GHG emissions, these values represent 0.034 percent and 0.033 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (EPA). When compared with worldwide GHG

emissions, these represent 0.0042 percent and 0.0040 percent, respectively, of the 52-gigaton 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions estimated above using the 100-year GWP are equivalent to the following based on the EPA Greenhouse Gas Equivalencies Calculator (2019b):

- 0.539 coal-fired power plant GHG emissions in one year (i.e., one power plant running for 197 days)
- GHG emissions avoided by 445 wind turbines running for one year

The corresponding numbers based on the 20-year GWP are 0.565 coal-fired power plants (i.e., one power plant running for 206 days) and 466 wind turbines.

3.3.3 Cumulative Impacts

Cumulative impacts are evaluated from the total production of federal and nonfederal coal, oil, and gas within the planning area as well as other past, present, and reasonably foreseeable sources of reportable GHG emissions. GHG emissions from the production, transportation, and downstream combustion of coal forecast to be produced on nonfederal lands in the planning area are evaluated following methods similar to those described above using EIA 2019 nonfederal coal production forecasts for the plan period. GHG emissions from the production and downstream combustion of oil and gas forecast to be developed from nonfederal minerals in the planning area, as described in the 2015 Proposed RMP/Final EIS (BLM 2015a), were assessed using methods similar to those described for federal oil and gas above. GWP values for both 20- and 100-year time horizons were used (see **Table 3-1**).

Direct and indirect emissions from nonfederal coal, oil, and gas were combined with direct and indirect emissions from federal coal, oil, and gas, as described above. These emission totals were also combined with emissions from large sources other than coal mining and oil and gas development and production in the planning area for the most recent year (2017) EPA FLIGHT data.

Table 3-7 shows the cumulative effects in terms of GHG emissions from the sources listed above. These include GHG emissions in the planning area. Examples are federal and nonfederal coal and oil and gas and other major sources, as well as downstream combustion emissions outside the area resulting from coal and oil and gas developed in the area.

Table 3-7
GHG Emissions as CO_2e from Cumulative Sources Based on 20-year and 100-year GWPs

Production	Emissions	GHG Emissions in CO_2e (MMT/year)	
		20-year GWP	100-year GWP
Federal coal production (average over planning period 22.4 MMst/year	GHG emissions from federal coal production (average)	1.7	0.6
	GHG emissions from federal coal transportation (average)	0.3	0.3
	GHG emissions from federal coal combustion (average)	38.1	37.9
Nonfederal coal production (average) 16.3 MMst/year	GHG emissions from nonfederal coal production (average)	1.3	0.5
	GHG emissions from nonfederal coal transportation (average)	0.2	0.2
	GHG emissions from nonfederal coal combustion (average)	27.6	27.4
Federal oil production (average) 3.0 MMBO/year	GHG emissions from federal oil production (average)	0.1	0.1
	GHG emissions from federal oil combustion (average)	1.3	1.3
Federal production of conventional and coalbed natural gas (average) 13.1 BCF/year	GHG emissions from federal gas production (average)	0.1	0.1
	GHG emissions from federal gas combustion (average)	0.7	0.7
Nonfederal oil production (average) 20.6 MMBO/year	GHG emissions from nonfederal oil production (average)	0.5	0.4
	GHG emissions from nonfederal oil combustion (average)	8.9	8.9
Nonfederal production of conventional and coalbed natural gas (average) 45 BCF/year	GHG emissions from nonfederal gas production (average, MMT/year)	0.5	0.4
	GHG emissions from nonfederal gas combustion (average)	2.5	2.5
Other cumulative GHG emission sources	GHG emissions from other major sources in 2017 in planning area from FLIGHT (EPA 2018a)*	0.8	0.8
Cumulative GHG emissions in CO_2e (annual average over plan period)	-	**84.5**	**81.9**

All numbers shown are annual average over the planning period except for FLIGHT data
MMst = million short tons; MMT = million metric tons; MMBO = million barrels of oil; BCF = billion cubic feet
Cumulative totals may not add up due to rounding.
* The FLIGHT data shown exclude Colstrip and Lewis & Clark power plants, which are already accounted for in the downstream combustion category.

3.3.4 Summary

GHG emissions from the production and downstream combustion of coal, oil, and conventional and coalbed natural gas under the RMP were calculated using 100-year and 20-year GWPs to represent GHG impacts over the longer-term 100-year time span used in the EPA's national GHG inventory and the shorter 20-year life of the RMP for comparison, respectively. GHG emissions

from coal transportation were also quantified. GWP values selected for this analysis represent the most current widely recognized and widely used estimates in the climate science community. Differences in CO_2e emissions between the two time horizons mostly reflect the short atmospheric lifetime of methane relative to carbon dioxide and nitrous oxide. As a result, the differences are largest for sources such as coal production with relatively large ratios of methane to carbon dioxide emissions.

Coal, oil, and gas production, and therefore GHG emissions, are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). Average annual GHG emissions over the SEIS/RMPA plan period for coal, oil, and gas are compared for federal and nonfederal resources and with other cumulative sources in **Table 3-8**. Cumulative annual average emissions (total CO_2e) are 84.5 MMT/year and 81.9 MMT/year using the 20-year and 100-year time horizon GWPs, respectively. These values represent 1.3 percent and 0.16 percent of total 2017 national and 2010 global annual CO_2e emissions, respectively, based on the 100-year time horizon values. They will contribute to the climate change impacts described above under *Affected Environment*.

Over the 20-year life of the plan, cumulative RMP sources will release 1,690 and 1,638 MMT CO_2e for 20-year and 100-year time horizon GWPs, respectively. Approximately three-fourths of emissions from the RFD are associated with nonfederal resources. Other cumulative sources in the planning area contribute just over 1 percent of total emissions (see **Table 3-8**). Downstream combustion is the dominant source of GHGs for coal, oil and gas; combustion CO_2e emissions account for 95% and 97% percent of the RFD (action) emissions for 20-year and 100-year time horizon GWPs, respectively.

By 2038, global GHG emissions are estimated to be between approximately 30 to 80 gigatons of CO_2e annually under the IPCC lower-bound and higher-bound Representative Concentration Pathways (RCP 2.6 and RCP 8.5), respectively (IPCC 2014). Cumulative annual average emissions over the plan period will then represent between 0.3 percent and 0.1 percent of the global emissions under different future global representative concentration scenarios and will contribute, in part, to the climate change impacts described above under *Affected Environment*.

Table 3-8
Summary of Annual Average GHG Emissions from Coal, Oil, and Gas Production, Transport, and Downstream Combustion over the 20-year Life of the MCFO SEIS/RMPA RFD

Source	CO_2e MMT/year (20-year GWPs)	CO_2e MMT/year (100-year GWPs)
Federal Action Total	42.3	40.9
Nonfederal Total	41.5	40.3
Other Cumulative Sources in the SEIS/RMPA planning area	0.8	0.8
Grand Total (Annual Average over Plan Period)	84.5	81.9

Appendix B

ERRATA Air Resources Technical Support Report

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ERRATA APPENDIX B
AIR RESOURCES TECHNICAL SUPPORT REPORT

This report provides additional details on the greenhouse gas (GHG) emissions estimates completed for the air resources analysis included in **Chapter 3** of the Supplemental Environmental Impact Statement (SEIS)/Resource Management Plan Amendment (RMPA) for the MCFO. **Tables 3-3** through **3-6** in **Section 3.3** of the SEIS/RMPA summarize total GHG emissions in units of carbon dioxide equivalents (CO_2e) from federal coal, federal oil, federal natural gas, and federal coalbed natural gas, respectively.

This appendix details GHG emissions by pollutant. **Tables B-1** through **B-4** show the GHG emissions from federal coal, federal oil, federal natural gas, and federal coalbed natural gas, respectively, for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which are the primary compounds that contribute to GHG emissions in the Miles City Field Office. **Table B-1** presents the CO_2, CH_4, and N_2O emissions from federal coal production, transportation, downstream combustion of federal coal, and compound totals. **Tables B-2** through **B-4** present the CO_2, CH_4, and N_2O emissions from oil and gas production and downstream combustion of federal oil and gas.

Oil and gas transportation emissions are assessed qualitatively in **Section 3.3** of the SEIS/RMPA. **Section 3.3** discusses the emission factors and methods used in the calculations; the data are available in the administrative record for the SEIS/RMPA.

Table B-1
CO_2, CH_4, and N_2O Emissions from Federal Coal Production, Transportation, and Downstream Combustion

Year	Federal RFD Coal Production Rate (MMst)[1]	CO_2 (metric tons)[2]				CH_4 (metric tons)[2]				N_2O (metric tons)[2]			
		Prod.	Trans.	Comb.	Total	Prod.	Trans.	Comb.	Total	Prod.	Trans.	Comb.	Total
2019	18.5	31,180	181,429	30,970,469	31,183,078	16,257	16	3,511	19,784	0.31	5.21	517	522.93
2020	25.4	42,925	276,088	42,635,429	42,954,441	22,381	24	3,511	25,916	0.43	7.93	712	720.64
2021	25.3	42,631	276,088	42,343,805	42,662,524	22,228	24	3,511	25,762	0.43	7.93	707	715.77
2022	24.6	41,505	276,088	41,225,913	41,543,506	21,641	24	3,511	25,176	0.42	7.93	689	697.08
2023	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2024	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2025	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2026	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2027	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2028	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2029	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2030	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2031	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2032	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2033	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2034	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2035	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2036	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2037	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2038	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49

[1] RFD=Reasonably Foreseeable Development; MMst: million short tons
[2] Prod=production; Trans=transportation; Comb=combustion

Table B-2
CO_2, CH_4, and N_2O Emissions from Federal Oil Production and Downstream Combustion

Year	Federal RFD Oil Production Rate (MMBO)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2020	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2021	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2022	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2023	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2024	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2025	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2026	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2027	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2028	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2029	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2030	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2031	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2032	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2033	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2034	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2035	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2036	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2037	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11
2038	3.0	54,951	1,305,371	1,360,322	268	52	321	0.57	10	11

[1] RFD=Reasonably Foreseeable Development; MMBO=million barrels of oil
[2] Totals may not sum exactly due to rounding

Table B-3
CO_2, CH_4, and N_2O Emissions from Federal Natural Gas Production and Downstream Combustion

Year	Federal RFD Natural Gas Production Rate (BCF)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2020	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2021	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2022	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2023	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2024	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2025	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2026	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2027	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2028	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2029	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2030	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2031	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2032	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2033	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2034	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2035	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2036	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2037	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2038	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1

[1] BCF=billion cubic feet; Sum of conventional natural gas and coalbed natural gas
[2] Totals may not sum exactly due to rounding

Table B-4
CO_2, CH_4, and N_2O Emissions from Federal Coalbed Natural Gas Production and Downstream Combustion

Year	Federal RFD Natural Gas Production Rate (BCF)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2020	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2021	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2022	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2023	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2024	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2025	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2026	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2027	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2028	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2029	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2030	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2031	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2032	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2033	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2034	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2035	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2036	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2037	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2038	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1

[1] BCF=billion cubic feet; Sum of conventional natural gas and coalbed natural gas
[2] Totals may not sum exactly due to rounding

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APPENDICES

A Coal Screening Process
B Air Quality Technical Support Document
C Coal Reasonably Foreseeable Development Scenario
D Coal Market Supplementary Report

ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACEC	area of critical environmental concern
AML	abandoned mine land
BCF	billion cubic feet
BLDTF	Black Lung Disability Trust Fund
BLM	United States Department of the Interior, Bureau of Land Management
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DOI	United States Department of the Interior
EIA	US Energy Information Administration
EPA	Environmental Protection Agency
ESA	Endangered Species Act
°F	degrees Fahrenheit
FLIGHT	Facility Level Information on Greenhouse Gases Tool
FLPMA	Federal Land Policy and Management Act
FR	*Federal Register*
GHG	greenhouse gas
GIS	geographic information system
GWP	global warming potential
IMPLAN	Impact Analysis for Planning Model
IPCC	Intergovernmental Panel on Climate Change
IRS	Internal Revenue Service
MCFO	Miles City Field Office
MFWP	Montana Fish, Wildlife and Parks
MMst	million metric short tons
MMT	million metric tons
N_2O	nitrous oxide
NCA	National Climate Assessment
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NRHP	National Register of Historic Places
PRB	Powder River Basin
RFD	reasonably foreseeable development
RMP(A)	resource management plan (amendment)
ROW	right-of-way

(S)EIS	(supplemental) environmental impact statement
SHPO	State Historic Preservation Office
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WSA	wilderness study area
WSR	Wild and Scenic River

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

In accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and the Federal Land Policy and Management Act of 1976, as amended (FLPMA), the Bureau of Land Management (BLM) Montana Miles City Field Office (MCFO) prepared this supplemental environmental impact statement (SEIS) and potential resource management plan amendment (RMPA) for the 2015 Proposed Resource Management Plan/Final Environmental Impact Statement. The BLM prepared this SEIS/RMPA in accordance with NEPA; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508); Department of Interior NEPA regulations (43 CFR 46); and the requirements of the BLM's NEPA Handbook, H-1790-1 (BLM 2008).

This SEIS/RMPA is in response to the federal district court's order in *Western Organization of Resource Councils, et al. v. Bureau of Land Management,* Civil Action No. CV 16-21-GF-BMM (D. Mont. 2017) (hereinafter, "order"). The court's order granted claims that the 2015 MCFO Final EIS was inadequate in three areas (the range of alternatives in relation to coal availability; downstream combustion of coal; and justification of the time-horizon for analyzing greenhouse gas emissions). The court's order directed the BLM to attempt supplemental analysis to resolve NEPA deficiencies in the 2015 Environmental Impact Statement. Through this SEIS/RMPA, the BLM will analyze a range of alternatives for coal availability not analyzed in 2015 (including new coal screening), analyze the climate change impacts of coal leasing, and analyze the downstream environmental consequences of fossil fuel combustion, including global warming potential over a 100-year time horizon.

If approved, the SEIS/RMPA will amend the 2015 RMP (BLM 2015b), and it will guide management of public lands administered by the MCFO into the future. Information about the RMPA/SEIS process can be obtained on the ePlanning website.[1]

[1] https://go.usa.gov/xmbE4

The 2015 RMP/Record of Decision was completed in September 2015 and provides management guidance and direction for approximately 2.75 million acres of BLM-administered surface land and 10.6 million acres of subsurface federal mineral estate in 17 eastern Montana counties. BLM management applies only to public lands, meaning those lands where the BLM has management responsibility for either the surface or the subsurface estate. **Figure ES-1** provides a map of the decision area.

ES.2 PURPOSE OF AND NEED FOR THE RESOURCE MANAGEMENT PLAN AMENDMENT

The purpose of this SEIS/RMPA is to provide additional land use planning-level analysis specifically regarding coal in the MCFO and to determine the lands to be made available for coal leasing. To support analysis in the SEIS/RMPA and subsequent decision-making, the BLM has conducted new coal screening, in accordance with 43 CFR 3420.1–4.

This SEIS/RMPA is needed in order to satisfy the following:

- Consider an alternative that would reduce the amount of recoverable coal and consider climate change impacts, in order to make a reasoned decision on the amount of recoverable coal made available
- Supplement the analysis of the environmental consequences of downstream combustion of coal open to development
- Justify the time horizon of the estimated global warming potential impacts (e.g., 20-year or 100-year) and to acknowledge the evolving science in this area

ES.3 SCOPING

The MCFO SEIS/RMPA public scoping process began on November 28, 2018, with publication of the Notice of Intent (NOI) in the *Federal Register* (FR) (83 FR 61167); it ended on December 28, 2018. On November 26, the BLM solicited comments from federal, state, and local agencies; Native American tribes; the public; stakeholders; and other interested parties. On December 13, the BLM MCFO conducted a public scoping meeting and a meeting with cooperating agencies at the field office in Miles City, Montana. The BLM announced the meeting through the NOI in the *Federal Register*, the ePlanning website, and news releases. The BLM MCFO has provided public access to SEIS/RMPA-related information on its ePlanning website.

During the public scoping period, the BLM received 32 unique written submissions, comprising 447 substantive comments. The BLM put the comments into seven issue categories. Most comments were received for resource-specific issues: coal, oil and gas, air quality, climate change, economic issues, best available information/baseline data, and the range of alternatives. Detailed information can be found in the scoping report on the MCFO SEIS/RMPA ePlanning website.

The BLM sent letters to eligible federal, state, and local agencies and tribes inviting them to be cooperating agencies and to assist with the SEIS/RMPA. The tribal letters also asked if the tribes wanted to initiate formal government-to-government consultation. The BLM held a cooperating agency meeting prior to the public scoping meeting on December 19, 2018.

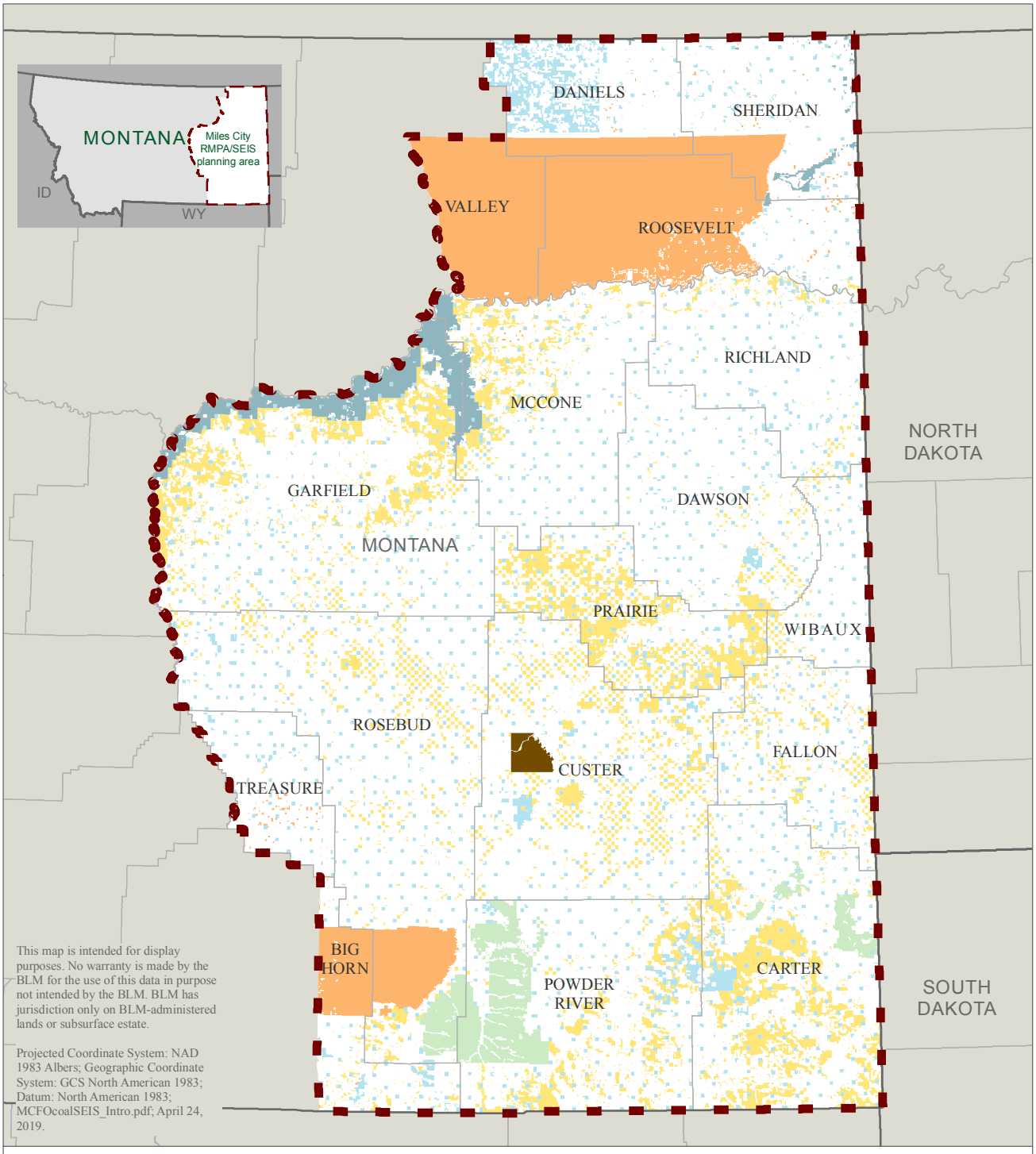

Figure ES-1
Surface Administration

ES.4 ISSUES

The BLM read and reviewed all 447 scoping comments received and categorized them into the following 7 issue categories:

- Best available information/baseline data
- Cumulative impacts
- Direct/indirect impacts
- Federal Land Policy and Management Act of 1976
- Other laws
- Range of alternatives
- Resource specific

The BLM further categorized the 447 comments received that pertained to resources and resource uses based on the specific resource or resource use. The Miles City Field Office SEIS and RMPA Scoping Report (BLM 2019) shows the number of comments by specific resource or resource use. Resource topics analyzed in detail are air resources, including greenhouse gases and climate change; water resources; wildlife, including special status species; rights-of-way, cultural resources, and economics.

ES.5 PLANNING CRITERIA

Planning criteria guide development of the SEIS/RMPA by defining the decision space. 43 CFR 1610.4-2(b) states that the "Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and coordination with any cooperating agencies and other Federal agencies, State and local governments, and federally recognized Indian tribes."

Planning criteria represent the overarching factors used to resolve issues and to develop alternatives. The planning criteria considered in the development of this document are as follows:

- The SEIS/RMPA complies with NEPA, FLPMA, and other applicable laws, executive orders, regulations, and policy.
- Lands covered in the SEIS/RMPA are federal lands, including split estate,[2] managed by the BLM. No decisions will be made relative to non-BLM-administered lands.
- The SEIS/RMPA makes land use planning decisions to allocate lands acceptable for further consideration for coal leasing.
- The SEIS/RMPA uses a collaborative and multi-jurisdictional approach to determine the desired future condition of public lands.
- Decisions in the plan are compatible with existing plans and policies of adjacent local, state, federal, and tribal agencies, as long as the decisions are consistent with

[2] Split estate is subsurface federal coal overlain by state or private surface lands within the decision area.

the purposes, policies, and programs of federal law and regulations applicable to public lands.

- The SEIS/RMPA recognizes valid existing rights.
- The SEIS/RMPA does not change existing planning decisions that are still valid.

ES.6 MANAGEMENT ALTERNATIVES

Issues identified through the BLM's scoping efforts and the court's order helped the interdisciplinary team identify three management alternatives. The BLM's action alternatives update and modify the coal screen used to determine coal suitability (**Appendix A**), resulting in a range of areas identified as acceptable for coal leasing. **Table ES-1**, below, shows a comparison of alternatives.

Table ES-1
Alternatives Summary and Coal Acceptability for Leasing[1]

Alternative	Acres Acceptable	Acres Unacceptable
Alternative A: No Action Alternative	1,581,238	325,433
Alternative B	990,815	758,328
Alternative C	144,877	1,604,266

Source: BLM GIS 2019

[1] Acres unacceptable for coal leasing and development are those without coal potential or lands that were identified as unacceptable for further consideration for leasing under the multiple-use screen, through the landowner consultation screen, and those that are unsuitable without exception under the unsuitability screen.

ES.6.1 Alternative A: No Action Alternative

For the No Action Alternative, the BLM brought forward management decisions from the coal screens performed for the Powder River and Big Dry RMPs into the 2015 Proposed RMP/Final EIS. The coal screens from the Powder River and Big Dry RMPs are included in the *Minerals Appendix* to the 2015 Proposed RMP/Final EIS. Although the coal screen is the same as the 2015 RMP, Alternative A uses the updated reasonably foreseeable development scenario to forecast production and surface disturbance within areas acceptable for further consideration for coal leasing.

ES.6.2 Alternative B

For Alternative B, new coal screens were applied to determine areas acceptable for further consideration for coal leasing and development. **Appendix A** includes the new detailed coal screens and their supporting data. In order to prevent adverse effects of coal leasing on air quality, a design feature to protect air resources was added to the coal screen under this alternative.

Alternative B applies a criterion for maintaining air quality standards as part of the multiple-use screen; however, existing data and modeling done for the 2015 Proposed RMP/Final EIS showed no air quality standards were exceeded based on the national ambient air quality standards under the Clean Air Act. Therefore, no resulting geographic area of land was unsuitable for coal development based on air resources.

In addition to the above screen, this alternative removes areas as unacceptable for further consideration for leasing under a multiple-use screen that considers conflicts with oil and gas wells; oil and gas units; perennial, riparian, and wetland resources; conservation easements; recreation areas; sport fishing reservoirs; areas of critical environmental concern; and cultural viewsheds.

ES.6.3 Alternative C

Alternative C uses the same coal screen applications for Screen 1 (coal potential), 2 (unsuitability), and 4 (landowner consultation) as Alternative B (**Appendix A**). For the multiple-use coal screen (Screen 3), Alternative C applies an additional air resources multiple-use criterion based on greenhouse gas emissions that would result from additional transportation to deliver coal to the existing infrastructure. The additional air criterion limits coal development to an 8-mile infrastructure area around the four existing mines in the decision area. The 8-mile area encompasses existing transportation infrastructure (for example, haul roads, conveyor belts, and railroad loops) associated with load-out facilities at the existing mines.

ES.7 Environmental Consequences

The purpose of the environmental consequences analysis in this SEIS/RMPA is to determine the potential for significant impacts of the federal action related to lands to be made acceptable for further consideration for coal leasing. The Council on Environmental Quality regulations for implementing NEPA state that the "human environment" is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR 1508.14). The "federal action" is the BLM's selection of an RMPA on which future land use actions related to coal availability will be based for the MCFO.

Table 1-3 of **Chapter 1** lists resources eliminated from the impacts analysis. Resources carried forward for analysis are included in **Chapter 3**, which objectively evaluates the likely direct, indirect, and cumulative impacts on the human and natural environment in terms of environmental, social, and economic consequences that are forecasted to occur from implementing the alternatives.

Because the RFD scenario is the same between all of the alternatives, and because those areas that are unsuitable for surface mining or surface mining operations with exceptions would still need to be mitigated in order to be developed, the impacts would not substantially vary by alternative. Furthermore, impacts are substantially similar to those disclosed in the 2015 Proposed RMP/Final EIS (BLM 2015a). Under Alternative A, there would be a slight reduction in impacts from those disclosed in 2015 because the RFD scenario forecasts a smaller disturbance area.

CHAPTER 1
PURPOSE AND NEED

1.1 INTRODUCTION

In accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and the Federal Land Policy and Management Act of 1976, as amended (FLPMA), the Bureau of Land Management (BLM) Montana Miles City Field Office (MCFO) prepared this supplemental environmental impact statement (SEIS) and potential resource management plan amendment (RMPA) for the 2015 Proposed Resource Management Plan/Final Environmental Impact Statement. This SEIS/RMPA is in response to the federal district court's order in *Western Organization of Resource Councils, et al. v. Bureau of Land Management,* Civil Action No. CV 16-21-GF-BMM (D. Mont. 2017) (hereinafter, "order").

The BLM prepared this SEIS/RMPA in accordance with NEPA; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508); Department of Interior NEPA regulations (43 CFR 46); and the requirements of the BLM's NEPA Handbook, H-1790-1 (BLM 2008).

1.2 PURPOSE OF AND NEED

The purpose of this SEIS/RMPA is to provide additional land use planning-level analysis specifically regarding coal in the MCFO and to determine the lands to be made available for coal leasing. To support analysis in the SEIS/RMPA and subsequent decision-making, the BLM has conducted new coal screening, in accordance with 43 CFR 3420.1–4.

This SEIS/RMPA is needed in order to satisfy the following:

- Consider an alternative that would reduce the amount of recoverable coal and consider climate change impacts, in order to make a reasoned decision on the amount of recoverable coal made available
- Supplement the analysis of the environmental consequences of downstream combustion of coal open to development
- Justify the time horizon of the estimated global warming potential impacts (e.g., 20-year or 100-year) and to acknowledge the evolving science in this area

1.3 DESCRIPTION OF THE DECISION AREA

The MCFO administers approximately 2.75 million acres of surface lands and 10.6 million acres of subsurface federal mineral estate in 17 eastern Montana counties. The decision area is the BLM-administered federal coal in the MCFO. This includes approximately 1.7 million acres of subsurface federal mineral coal estate for which the BLM has the authority to determine its availability (16 percent of federal mineral estate within the MCFO; **Figures 1-1** and **1-2**).

1.4 SCOPING ISSUES

The MCFO SEIS/RMPA public scoping process began on November 28, 2018, with publication of the Notice of Intent (NOI) in the *Federal Register* (FR) (83 FR 61167); it ended on December 28, 2018. On November 26, the BLM solicited comments from federal, state, and local agencies; Native American tribes; the public; stakeholders; and other interested parties. On December 13, the BLM MCFO conducted a public scoping meeting and a meeting with cooperating agencies at the field office in Miles City, Montana. The BLM announced the meeting through the NOI in the *Federal Register*, the ePlanning website,[1] and news releases. The BLM MCFO has provided public access to SEIS/RMPA-related information on its ePlanning website.

During the public scoping period, the BLM received 32 unique written submissions, comprising 447 substantive comments. The BLM put the comments into seven issue categories. Most comments were received for resource-specific issues: coal, oil and gas, air quality, climate change, economic issues, best available information/baseline data, and the range of alternatives. Detailed information can be found in the scoping report on the MCFO SEIS/RMPA ePlanning website.

1.4.1 Issues Identified for Detailed Consideration

Planning issues are disputes or controversies about existing and potential land and resource allocations, levels of resource use, production, and related management practices (BLM Land Use Planning Handbook H-1601-1; BLM 2005). These issues help inform alternatives development. A detailed description of the planning issues identified during public scoping can be found in the scoping report on the MCFO SEIS/RMPA ePlanning website. **Table 1-1** aligns the planning issues identified for detailed consideration with the resources affected by the issues. **Chapter 3** analyzes the issues as they pertain to the identified resources.

[1] https://go.usa.gov/xmbE4

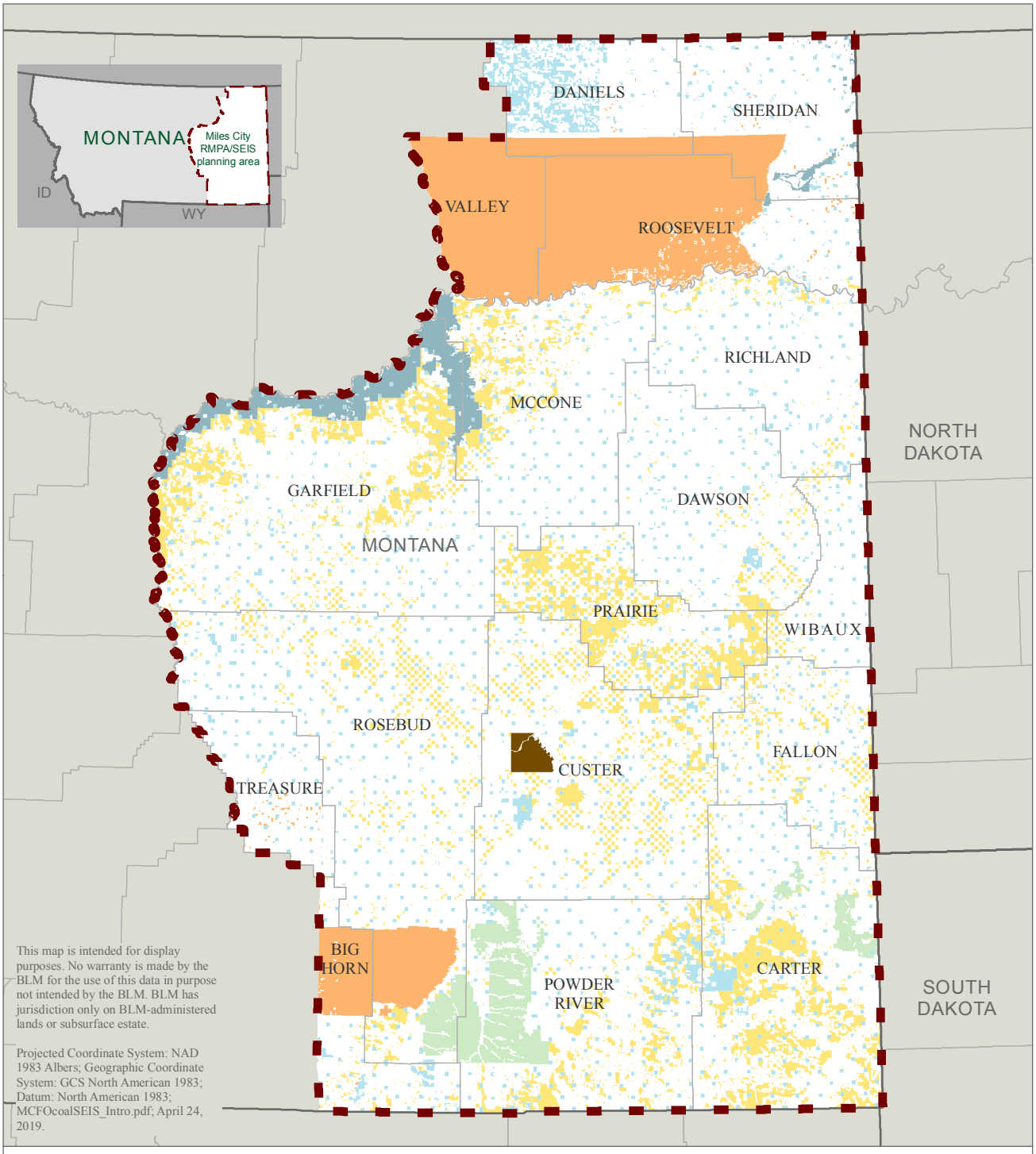

Figure 1-1
Surface Administration

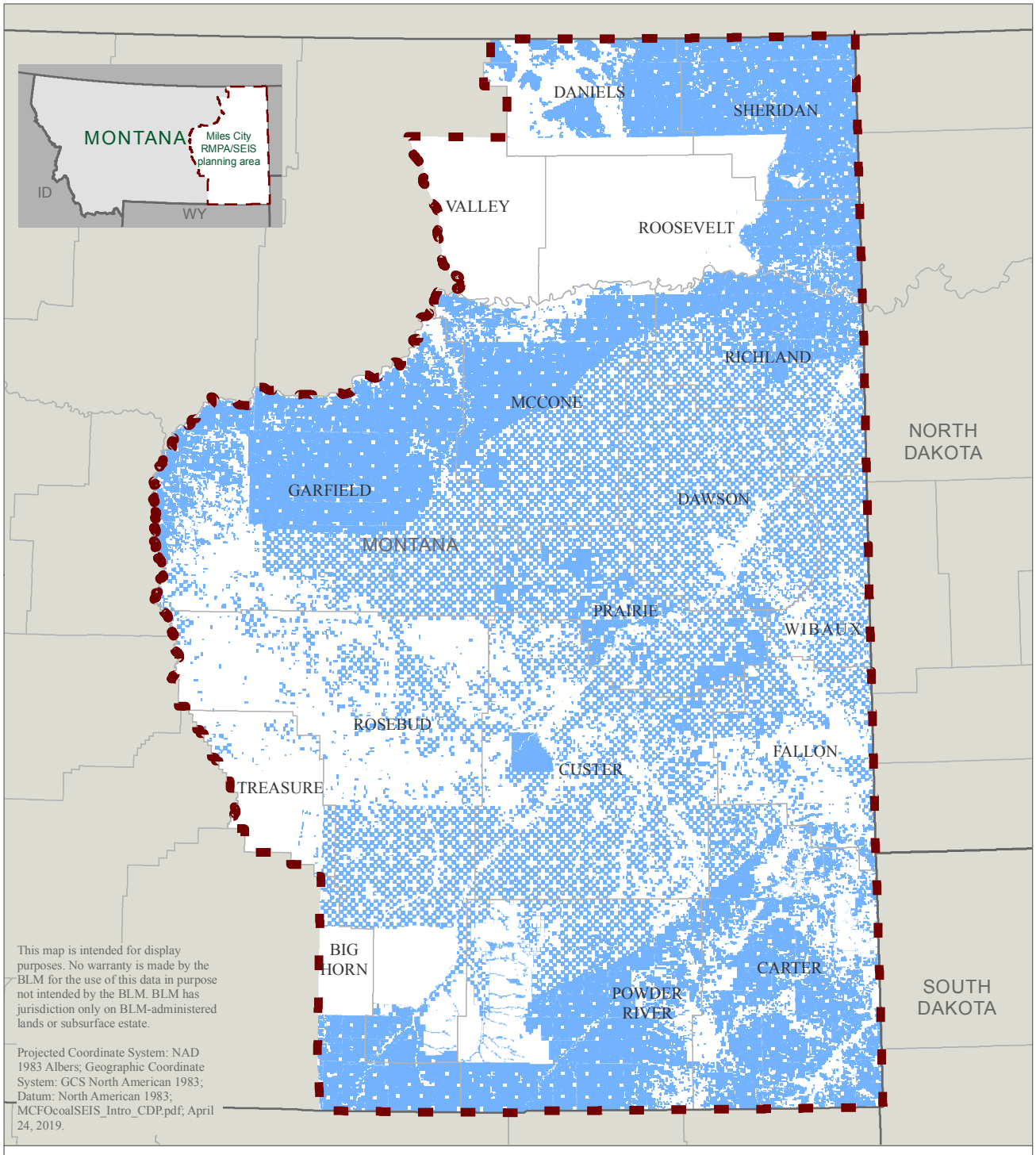

Figure 1-2
BLM-administered Coal

Table 1-1
Scoping Issues and Resource Topics Affected

Issue	Resource Topic Affected
What new information will be referenced in the SEIS/RMPA?	Air resources (including greenhouse gases and climate change), coal, and socioeconomics will all be updated, based on the following: • 2018 minerals production data • New coal screening • Updated reasonably foreseeable development scenario • Greenhouse gas emissions inventory and downstream emissions Resource data will be updated for the coal potential decision area.
What are the cumulative impacts of the proposed actions?	See **Chapter 3** for the cumulative impacts analysis for resources carried forward.
What are the direct and indirect impacts of the proposed actions?	See **Chapter 3** for the impacts analysis for resources carried forward.
Will the SEIS/RMPA analyze a no leasing alternative? What alternatives will be included in the SEIS/RMPA?	See **Chapter 2** for a range of alternatives.
What methods will be used to address downstream impacts of fossil fuel leasing and use?	See **Chapter 3**, Air Resources.
Will the BLM quantify downstream combustion emissions for fossil fuels, analyze the impacts of these emissions with available methods under each alternative, and study the extent to which the alternatives (including a no leasing alternative) alter the total amount of downstream greenhouse gas emissions?	See **Chapter 2** for a range of alternatives and **Chapter 3**, Air Resources.
How will the BLM comply with the multiple-use mandate of FLPMA?	This SEIS augments the existing RMP, meeting the multiple-use mandate of FLPMA. The BLM considered multiple uses during evaluation of Screen 3; see **Appendix A**.
How will the BLM comply with the requirements of the final judgment issued by the district court?	See **Chapter 1** for the purpose and need, **Chapter 2** for the range of alternatives, **Chapter 3**, Air Resources and Economic Considerations, and **Appendix A**.
What sources of air emissions will be included in the SEIS/RMPA?	See **Chapter 3**, Air Resources.
How do regional emissions compare with federal emissions?	See **Chapter 3**, Air Resources.
How will greenhouse gas emissions be quantified and analyzed in the potential actions to avoid regional and national greenhouse gas emissions?	See **Chapter 3**, Air Resources, and **Appendix B**.
Will there be a federal emissions baseline?	See **Chapter 3**, Air Resources.
Will the BLM update global warming potential data for methane?	See **Chapter 3**, Air Resources.
Will the SEIS/RMPA incorporate the newest National Climate Assessment and other national and state climate literature?	See **Chapter 3**, Air Resources.

Issue	Resource Topic Affected
Where have previous cultural resource surveys been conducted, and will the BLM include the results of previous surveys in the SEIS? How will the BLM maintain compliance with the National Historic Preservation Act?	See **Chapter 3**, Cultural Resources, and **Appendix A**.
How will the BLM identify cultural resource sites that the proposed action may disturb?	See **Chapter 3**, Cultural Resources, and **Appendix A**.
How will the BLM analyze the impact of the proposed action on declining wildlife habitat and populations, and how will it mitigate impacts?	See **Chapter 3**, Special Status Species and Fish and Wildlife, and **Appendix A**.
How will the BLM analyze the impacts of noise on wildlife?	See **Chapter 3**, Fish and Wildlife, and **Appendix A**.
Will the BLM conduct new coal screening for the planning area?	See **Appendix A**.
How will the BLM consider circumstances that have changed since the 2015 Proposed RMP/Final EIS?	See **Appendices A** and **C**.
What are the economic contribution of the external costs of mining, transporting, and burning coal?	See **Chapter 3**, Air Resources.
What tools will the BLM use to examine the economic contribution to the region from fossil fuel employment?	See **Chapter 3**, Economic Considerations, and **Appendix D**.
How will coal development affect lands and realty in the planning area?	See **Chapter 3**, Lands and Realty, and **Appendix A**.

1.4.2 Issues Considered but Not Further Analyzed in this SEIS/RMPA

The issues identified during public scoping (discussed above) shaped the alternatives carried forward in this SEIS/RMPA. The BLM also considered other issues identified during public scoping but did not analyze them further; this is because they fall outside of our jurisdiction or are beyond the scope of this SEIS/RMPA (**Table 1-2**). These issues and the rationale for not analyzing them further are provided below.

Table 1-2
Scoping Issues not Further Analyzed and the Rationale for not Analyzing Further

Issue	Rationale
How will the BLM define undue degradation?	This is out of scope. Undue degradation is defined in 43 CFR 3809.5.
Will any alternatives contain requirements or lease stipulations requiring emission control technologies?	This is out of scope. This SEIS/RMPA does not consider stipulations for fluid minerals leasing and development. Those are included in the 2015 RMP/Record of Decision (ROD).
How will the BLM no surface occupancy waivers affect the effectiveness of Greater Sage-Grouse conservation measures?	This is out of scope. Oil and gas-related impacts were disclosed in the 2015 Proposed RMP/Final EIS.
Will the BLM complete additional lands with wilderness characteristics inventories during the SEIS/RMPA process? Will the BLM make lands with wilderness characteristics inventory forms publicly available?	This is out of scope. Lands with wilderness characteristics inventories were conducted as part of the RMP process. Inventory forms are available through the MCFO.
What management actions will be in the SEIS/RMPA for areas identified as possessing lands with wilderness characteristics?	This is out of scope. Management actions for lands with wilderness characteristics are identified in the 2015 RMP.
How will toxic air emissions be mitigated?	This is out of scope because it does not meet the purpose and need of the SEIS/RMPA.

Issue	Rationale
How will the BLM differentiate air quality management between federal and state agencies?	This is out of scope because it does not meet the purpose and need of the SEIS/RMPA. Analysis was included as part of the 2015 Proposed RMP/Final EIS.
How will air pollution affect regional air quality, and how will the BLM analyze criteria air pollutants?	This is out of scope because it does not meet the purpose and need of the SEIS/RMPA. Analysis was included as part of the Proposed RMP/Final EIS.
Will the BLM offer any protections in lands with wilderness characteristics areas until the SEIS/RMPA is completed?	Lands with wilderness characteristics were considered in the multiple-use coal screen and lands removed from further consideration for leasing; see **Appendix A**.
How will the BLM update the SEIS/RMPA to include descriptions and analyses of lands with wilderness characteristics in the planning area?	Lands with wilderness characteristics were not considered in the multiple-use coal development potential area (Screen 1). See **Appendix A**. A detailed analysis of impacts is not needed because there would be no impacts on lands with wilderness characteristics.
How will noise from mineral development affect recreation in the planning area?	Recreation areas were considered in the multiple-use coal screen and lands removed from further consideration for leasing. See **Appendix A**.
What types of conditions will the BLM use to reduce impacts from oil and gas development on resources in the planning area?	This is out of scope. This was considered in the 2015 Proposed RMP/Final EIS and does not meet the purpose and need of this SEIS/RMPA.
How will the BLM analyze potential impacts of hydraulic fracturing in the SEIS/RMPA?	This is out of scope. This was considered in the 2015 Proposed RMP/Final EIS and does not meet the purpose and need of this SEIS/RMPA.
What is the impact of fossil fuel development and use on public health and safety?	This is out of scope because it does not meet the purpose and need of the SEIS/RMPA. Analysis was included as part of the 2015 Proposed RMP/Final EIS.
What are the social effects of greenhouse gas emissions that result from fossil fuel development and use?	The social effects of climate change are disclosed in the 2015 Proposed RMP/Final EIS under pertinent resource and resource use sections. Impacts would not be substantially different from those disclosed in that EIS.
Which demographics are most vulnerable to climate-related effects that result from greenhouse gas emissions?	Environmental justice impacts were disclosed in the 2015 Proposed RMP/Final EIS. There are no disproportionately affected populations within the impact analysis area.
Will the SEIS/RMPA analyze the risk of "carbon lock-in"?	This is out of scope because it does not meet the purpose and need of the SEIS/RMPA.
What protections will be made to areas being proposed to be managed as an areas of critical environmental concern (ACECs) in the SEIS/RMPA?	ACECs were considered in the multiple-use coal screen and lands removed from further consideration for leasing. See **Appendix A**.
How will the BLM approach travel planning for this project?	The travel management areas, Hay Draw and Knowlton, were removed through the multiple-use screen (see **Appendix A**). Additional considerations for travel management are out of scope because they do not meet the purpose and need of this SEIS/RMPA.
Will the BLM inventory additional areas for consideration of meeting wild and scenic river (WSR) eligibility? Will the BLM add WSR inventory sheets to the SEIS/RMPA or make a stand-alone WSR report publicly available?	This is out of scope because it does not meet the purpose and need of this SEIS/RMPA. This was considered in the 2015 Proposed RMP/Final EIS.
Will the BLM analyze specific management actions for wilderness study areas (WSAs) that Congress has recently released from wilderness study?	This is out of scope. WSA management and analysis were included in the 2015 Proposed RMP/Final EIS.

Issue	Rationale
What is the projected monetized value of impacts from coal development in the planning area, and how do these relate to the value of the projected coal mining?	The BLM is not required to do a cost-benefit analysis in NEPA (40 CFR 1502.23). The BLM conducted an economic contribution analysis to analyze the potential economic output of forecasted coal development in the decision area (see **Chapter 3**, Economic Considerations).
Will the BLM analyze the economic resilience of communities in the planning area?	This is out of scope. The analysis acknowledges the relative importance of the coal industry in the context of the geographic area. However, the economic resilience is not germane to the analysis.

1.4.3 Resource Topics Not Carried Forward for Detailed Analysis

Table 1-3 lists the resources eliminated from further analysis and the rationale for elimination. In some cases, resources are not present in the decision area, so actions proposed in this SEIS/RMPA would not affect them. Through the coal screening process, some resources would be removed from the potential for coal development under Alternatives B and C either because they would be determined unacceptable for further consideration for leasing (Screen 3) or because they would be determined unsuitable for coal development without exception (Screen 2). In other cases, the action alternatives would not propose anything that would change the impacts disclosed in the 2015 Proposed RMP/Final EIS, so those resources are not carried forward for additional analysis in this SEIS/RMPA. In all cases, impacts under the No Action Alternative would not be substantially different from those described in the 2015 Proposed RMP/Final EIS[2] and are not carried forward further in this SEIS/RMPA.

Table 1-3
Resources Eliminated from Further Analysis and the Rationale

Resource	Rationale
Wild horses and burros	Not present in the decision area.
Wilderness areas	Not present in the decision area.
Wild and scenic rivers	Not present in the decision area.
Natural resource waters	Not present in the decision area.
Vegetation	No threatened or endangered plant species in the decision area. No change in impacts from the 2015 Proposed RMP/Final EIS for other vegetation resources.
Leasable minerals: fluids	Removed through the multiple-use screen; see **Appendix A**. The impacts on air resources required in the court's order are disclosed under **Section 3.3**, Air Resources, Including Greenhouse Gasses and Climate Change.
Areas of critical environmental concern	Removed through the multiple-use screen; see **Appendix A**.
National trails	The Lewis and Clark National Historic Trail is present within the decision area; however, as a special recreation management area, it was removed during the multiple-use screen. The cultural component is also unsuitable without exception under criterion 7.

[2] Since 2015, the BLM has updated the reasonably foreseeable development (RFD) scenario for coal from what was analyzed in that EIS based on current market conditions. Under the No Action Alternative in this SEIS/RMPA, impacts would be slightly reduced from what was disclosed in the proposed plan in the 2015 Proposed RMP/Final EIS because the RFD scenario is forecasted to be lower than what was forecasted in 2015.

Resource	Rationale
Wilderness study areas	WSAs were removed during the multiple-use coal screen; see **Appendix A**.
Recreation and visitor services	Recreation areas were removed during the multiple-use coal screen; see **Appendix A**.
Sport fisheries	Sport fisheries were removed during the multiple-use coal screen; see **Appendix A**.
Visual resources	Visual Resource Management Class I areas are unsuitable without exception (criterion 5); see **Appendix A**. Otherwise, no change in impacts from the 2015 Proposed RMP/Final EIS.
Travel and transportation management	Travel management areas were removed during the multiple-use coal screen; see **Appendix A**.
Perennial streams, riparian areas, and wetland areas	These areas were removed during the multiple-use coal screen; see **Appendix A**.
100-year floodplains	100-year floodplains are unsuitable without exception under criterion 18; see **Appendix A**.
Paleontological resources	No change in impacts from the 2015 Proposed RMP/Final EIS.
Soil resources	No change in impacts from the 2015 Proposed RMP/Final EIS.
Wildland fire management	No change in impacts from the 2015 Proposed RMP/Final EIS.
Livestock grazing	No change in impacts from the 2015 Proposed RMP/Final EIS.
Forest and woodland products	No change in impacts from the 2015 Proposed RMP/Final EIS.
Leasable minerals: coal	No change in impacts from the 2015 Proposed RMP/Final EIS.
Locatable minerals	No change in impacts from the 2015 Proposed RMP/Final EIS.
Mineral materials	No change in impacts from the 2015 Proposed RMP/Final EIS.
Nonenergy leasable minerals	No change in impacts from the 2015 Proposed RMP/Final EIS.
Renewable energy	No change in impacts from the 2015 Proposed RMP/Final EIS.
Backcountry byways	No change in impacts from the 2015 Proposed RMP/Final EIS.

1.5 PLANNING CRITERIA AND REGULATORY CONSTRAINTS

1.5.1 Planning Criteria

Planning criteria guide development of the SEIS/RMPA by defining the decision space. 43 CFR 1610.4-2(b) states that the "Planning criteria will generally be based upon applicable law, Director and State Director guidance, the results of public participation, and coordination with any cooperating agencies and other Federal agencies, State and local governments, and federally recognized Indian tribes."

Planning criteria represent the overarching factors used to resolve issues and to develop alternatives. The planning criteria considered in the development of this document are as follows:

- The SEIS/RMPA complies with NEPA, FLPMA, and other applicable laws, executive orders, regulations, and policy.
- Lands covered in the SEIS/RMPA are federal lands, including split estate,[3] managed by the BLM. No decisions will be made relative to non-BLM-administered lands.

[3] Split estate is subsurface federal coal overlain by state or private surface lands within the decision area.

- The SEIS/RMPA makes land use planning decisions to allocate lands acceptable for further consideration for coal leasing.
- The SEIS/RMPA uses a collaborative and multi-jurisdictional approach to determine the desired future condition of public lands.
- Decisions in the plan are compatible with existing plans and policies of adjacent local, state, federal, and tribal agencies, as long as the decisions are consistent with the purposes, policies, and programs of federal law and regulations applicable to public lands.
- The SEIS/RMPA recognizes valid existing rights.
- The SEIS/RMPA does not change existing planning decisions that are still valid.

This planning is not intended to be a full RMP revision; rather, it is to provide additional analysis for land use planning as it pertains to air quality and economics. It is also to make plan-level decisions regarding the availability of lands for further consideration for leasing and the unsuitability of lands for all or certain stipulated methods of surface coal mining, consistent with the court's order. Due to the limited focus of this planning, the BLM did not address decisions that would normally be considered in a full RMP revision.

1.5.2 Regulatory Constraints

Coal Screening Process

The BLM's authority to manage MCFO coal resources comes from the Mineral Leasing Act of 1920, as amended; the Mineral Leasing Act on Acquired Lands of 1947, as amended; and the FLPMA. Regulations developed from these statutes are in 43 CFR 3000 and 3400; these regulations guide the BLM coal program management, setting requirements for land use planning, leasing, and post lease maintenance.

Coal planning regulations in 43 CFR 3420.1–4 require the BLM to identify federal lands acceptable for further consideration for leasing. These lands are analyzed in the land use planning process. The four coal screens are applied as follows:

1. Identification of coal with development potential—Lands determined to have development potential are considered acceptable for further consideration for leasing and are applied to the remaining coal screens. Lands determined to not have development potential are eliminated from further consideration for leasing.
2. Application of unsuitability criteria—Lands with coal potential are assessed with procedures outlined in 43 CFR 3461. Lands within coal potential may be eliminated from further consideration for leasing if determined to be unsuitable without exception pursuant to Section 522(b) of the Surface Mining Control and Reclamation Act. In accordance with 43 CFR 3461.2-1, the BLM could, based on additional site-specific surveys or changes in resource conditions, change the unsuitability determination of a given tract at the activity planning stage.
3. Multiple-use conflict analysis—43 CFR 3420.1-4e(3) states that "multiple land use decisions shall be made which may eliminate additional coal deposits from further

consideration for leasing, to protect resource values of a locally important or unique nature not included in the unsuitability criteria." Multiple-use values may include possible oil and gas development and soil, forest, wildlife, recreation, agriculture, and watershed resources. Lands within coal potential may be eliminated from further consideration for leasing where multiple uses conflict.

4. Surface owner consultation—This screen requires the BLM to consult with qualified surface owners whose land overlies federal coal with development potential. The BLM asks the owners for their preference for or against offering the coal deposits under their land for lease. Lands within coal potential may be eliminated from further consideration for leasing based on qualified surface owner preference.

Federal lands made acceptable for coal leasing and development through coal screening in the MCFO are the subject of this SEIS/RMPA analysis; results of the coal screening process are in **Appendix A**.

Coal and Mineral Leasing Management Specific Laws, Regulations, and Policies

The BLM has several laws, regulations, and policies that guide its management of federal coal resources, as follows:

- The Mineral Leasing Act of 1920, as amended
- The Mineral Leasing Act for Acquired Land of 1947, as amended
- Federal Coal Leasing Amendments Act of 1976
- FLPMA
- Surface Mining Control and Reclamation Act of 1977
- 43 CFR 3000 and 3400

Relationship to Other Federal Laws, Regulations, Policies, and Programs

Numerous federal and state laws and applicable regulations, policies, and actions affect the alternatives analyzed in the SEIS/RMPA.

FLPMA is the primary authority for BLM's management of public lands and provides the policy by which the BLM manages coal resources on federal lands. The BLM MCFO will make decisions for coal leasing availability under this SEIS/RMPA and is required to follow the mandates of FLPMA when making those decisions.

The land use decisions made in this SEIS/RMPA require analysis under NEPA. The BLM MCFO will analyze the impacts of the coal leasing decisions on the other resources identified in the decision area, including air quality, climate change, socioeconomics, and the other resources identified in **Table 1-1**.

See the 2015 Proposed RMP/Final EIS (BLM 2015a) for the full list of additional laws, regulations, policies, and programs that are relevant to this analysis (Chapter 1, beginning on page 1-12).

1.6 COLLABORATION

The BLM is engaging in ongoing collaboration with federal, tribal, state, and local governments as part of this planning process. This collaboration includes government-to-government consultation with affected Native American tribes, the participation of cooperating agencies, and consultation with regulatory agencies, as required by law. **Chapter 4**, Coordination and Consultation, provides more information about the involvement of these stakeholders.

1.7 RELATIONSHIP TO STATE AND LOCAL PLANS

In developing this proposed SEIS/RMPA, the BLM has considered plans of other state, local, and federal agencies that are relevant and kept consistency with or was complementary to these plans, as required by the consistency provisions of FLPMA (43 United States Code [USC] 1712[c][9]) and the BLM's planning regulations at 43 CFR 1610.3–2. The plans considered during this supplemental analysis are consistent with and are listed in the 2015 Proposed RMP/Final EIS (pages 1-16 and 1-17).

CHAPTER 2
ALTERNATIVES

2.1 INTRODUCTION

The BLM MCFO developed the two action alternatives considered in this SEIS/RMPA in coordination with cooperating agencies, interested stakeholders (including private landowners), county and state governments, tribal governments, and comments received from the general public during the public scoping period.

The SEIS/RMPA alternatives focus solely on coal leasing in response to the court's order. The range of alternatives meets the purpose and need for the SEIS/RMPA and responds to issues raised during scoping (see **Section 1.4**, and **Section 4.3**; and the BLM Miles City Field Office RMP SEIS Scoping Report). The alternatives are described in detail in **Sections 2.2.3**, **2.2.4**, and **2.2.5**.

2.2 ALTERNATIVES DEVELOPMENT

After the public scoping period closed on December 28, 2018, the BLM MCFO began developing alternatives. The BLM MCFO developed three alternatives, including the No Action Alternative. This was based on public input, the court's order, updated coal screening, and the defined purpose and need for the SEIS/RMPA.

A summary of lands acceptable for further consideration for coal leasing and development for the action alternatives is provided in **Tables 2-1**, **2-2,** and **2-3.**

2.2.1 BLM Coal Screening Process

The BLM performed coal screens 1–4 (see **Chapter 1**, **Section 1.5.2**, page 1-9, and **Appendix A**) in order to formulate the action alternatives. In addition, the BLM reviewed the *Minerals Appendix* of the 2015 Proposed RMP/Final EIS, decisions made in the 2015 RMP/Record of Decision (which precluded coal development; BLM 2015a), new scientific data, and new GIS data. The BLM evaluated issues identified through internal and public scoping (see **Section 1.4**, and **Section 4.3**; and the BLM Miles City Field Office RMP SEIS Scoping Report). In accordance with 43 CFR 3461.2-1, the BLM could, based on additional site-specific surveys or changes in resource conditions, change the unsuitability determination of a given tract at the activity planning stage.

2.2.2 Alternative A (No Action Alternative)

For the No Action Alternative, the BLM brought forward management decisions from the coal screens performed for the Powder River and Big Dry RMPs into the 2015 Proposed RMP/Final EIS. The coal screens from the Powder River and Big Dry RMPs are included in the *Minerals Appendix* to the 2015 Proposed RMP/Final EIS.

Figure 2-1 shows the coal acceptability geospatial results from the 2015 Proposed RMP/Final EIS for the No Action Alternative. **Table 2-1** depicts the overall coal acceptability results for Alternative A.

Table 2-1
Coal Acceptability Results for Alternative A

Acceptable (acres)	Unacceptable (acres)
1,581,238	325,433

Source: BLM 2015a

2.2.3 Alternative B

For Alternative B, new coal screens were applied to determine areas acceptable for further consideration for coal leasing and development. **Appendix A** includes the new detailed coal screens and their supporting data. In order to prevent adverse effects of coal leasing on air quality, a design feature to protect air resources was added to the coal screen under this alternative.

Alternative B applies a criterion for maintaining air quality standards as part of the multiple-use screen; however, existing data and modeling done for the 2015 Proposed RMP/Final EIS showed no air quality standards were exceeded based on the national ambient air quality standards under the Clean Air Act. Therefore, no resulting geographic area of land was unsuitable for coal development based on air resources.

In addition to the above screen, this alternative removes areas as unacceptable for further consideration for leasing under a multiple-use screen that considers conflicts with oil and gas wells; oil and gas units; perennial, riparian, and wetland resources; conservation easements; recreation areas; sport fishing reservoirs; areas of critical environmental concern; and cultural viewsheds.

Figure 2-2 shows the geospatial results of the four coal screens for Alternative B. **Table 2-2** depicts the coal screening results.

For unsuitability criterion 15, Habitat for Species of High Interest to the State, the BLM would apply a stipulation to coal development as detailed in **Appendix A**.

The BLM has identified Alternative B as the preferred alternative.

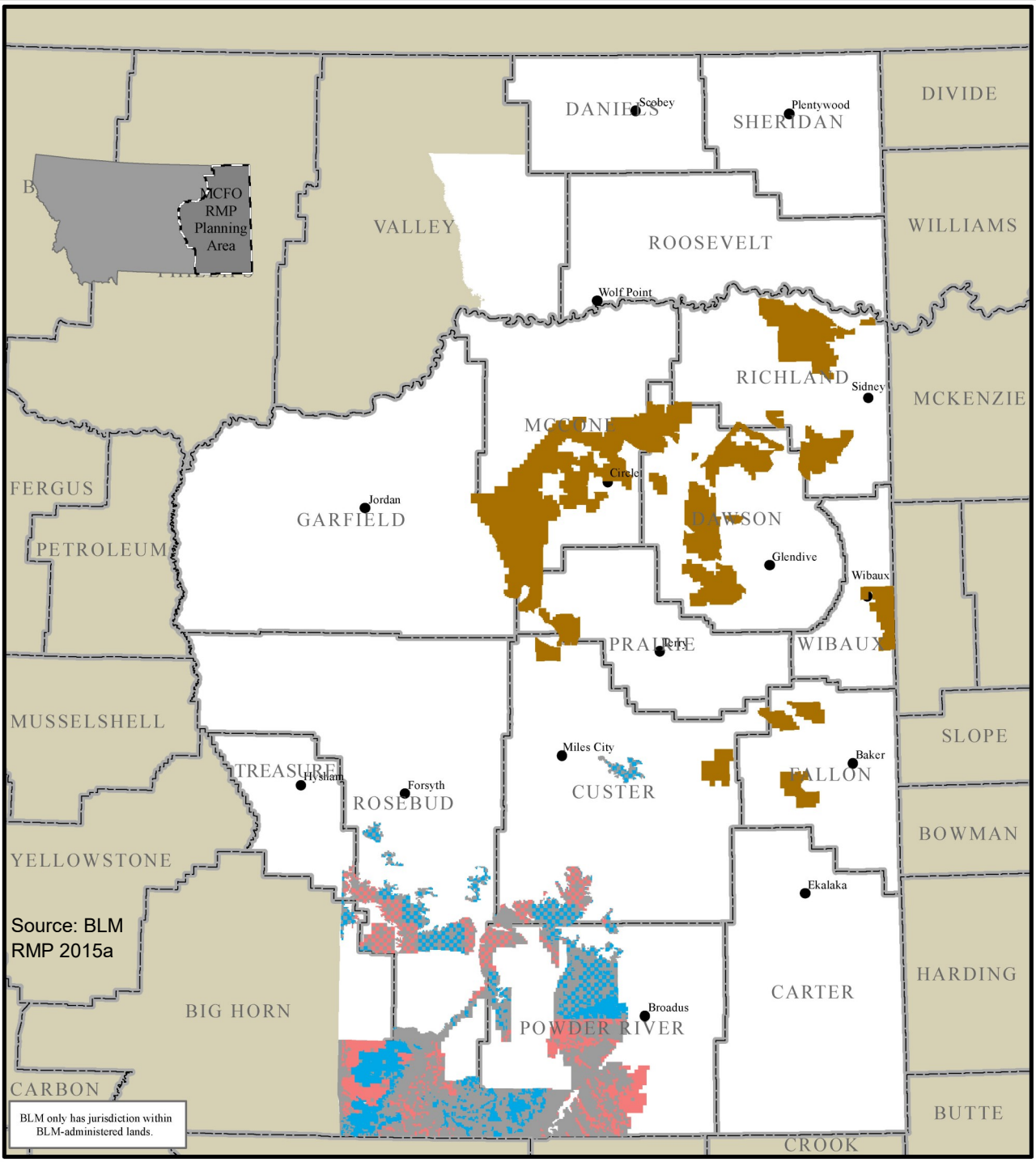

Figure 2-1
Alternative A: Areas Acceptable for Further Consideration for Leasing

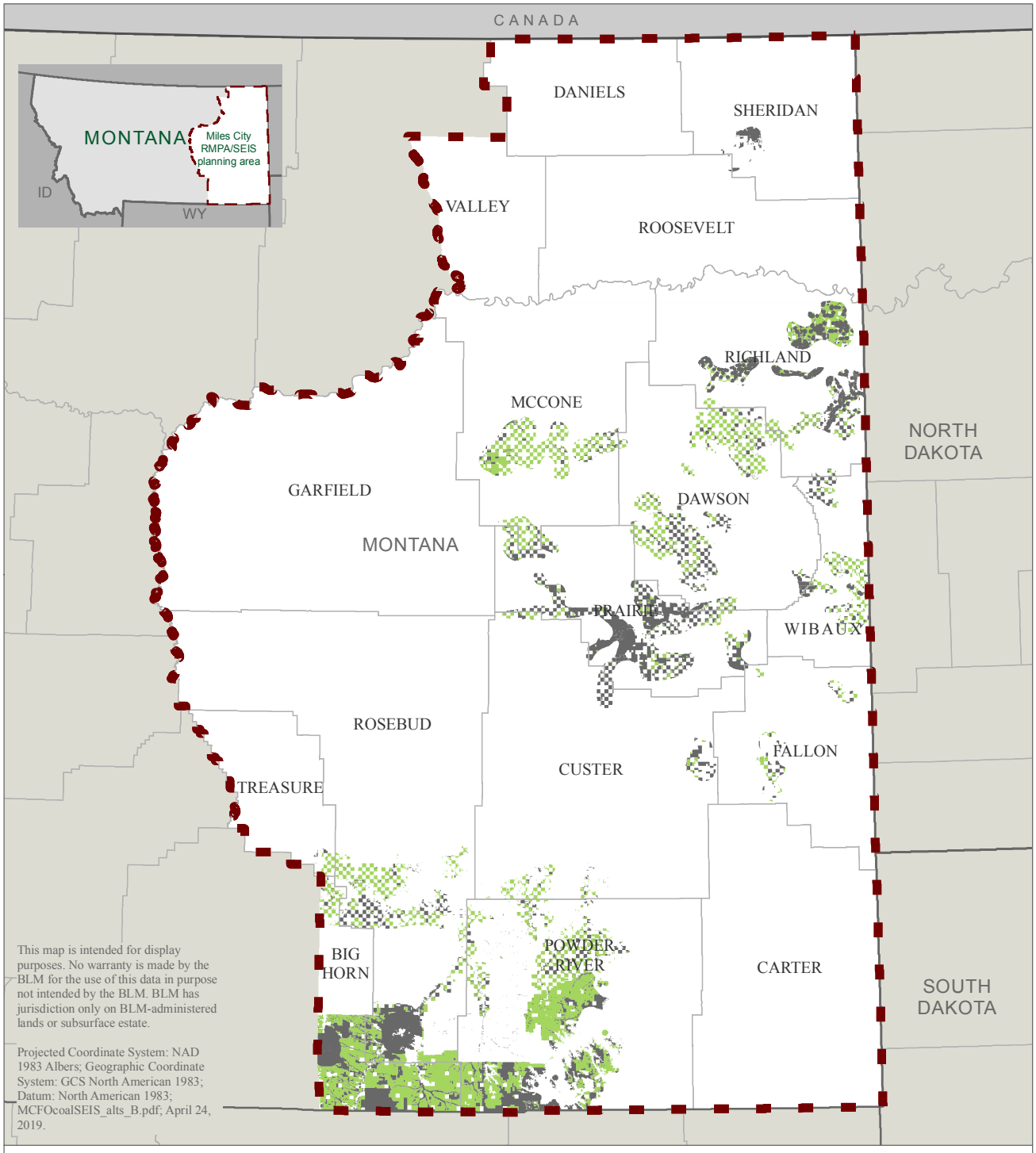

Figure 2-2
Alternative B: Areas Acceptable for Further Consideration for Leasing

Table 2-2
Coal Screening Results for Alternative B

Coal Screen[1]	Total (acres)[2]
Coal potential (Screen 1)	1,749,143
Unsuitable for all methods of coal mining without exception (Screen 2)	201,269
Unsuitable for all or certain stipulated methods of coal mining with exception/stipulation (Screen 2)	1,258,897
Unacceptable for further consideration for leasing (Screen 3)	186,197
Unacceptable for further consideration for leasing (Screen 4)	489,619
Total Acceptable for Coal Leasing and Development	***990,815***
Total Unacceptable for Coal Leasing and Development	***758,328***

[1] See **Appendix A** for full coal screening results.
[2] There is overlap between the coal screens; acres are not additive.

2.2.5 Alternative C

Alternative C uses the same coal screen applications for Screen 1 (coal potential), 2 (unsuitability), and 4 (landowner consultation) as Alternative B (**Appendix A**). For the multiple-use coal screen (Screen 3), Alternative C applies an additional air resources multiple-use criterion based on greenhouse gas emissions that would result from additional transportation to deliver coal to the existing infrastructure. The additional air criterion limits coal development to an 8-mile infrastructure area around the four existing mines in the decision area. The 8-mile area encompasses existing transportation infrastructure (for example, haul roads, conveyor belts, and railroad loops) associated with load-out facilities at the existing mines.

Figure 2-3 shows the geospatial results of the four coal screens for Alternative C. **Table 2-3** depicts the coal screening results.

For unsuitability criterion 15, Habitat for Species of High Interest to the State, the BLM would apply the same stipulation to coal development as described for Alternative B.

Table 2-3
Coal Screening Results for Alternative C

Coal Screen[1]	Total (acres)[2]
Coal potential (Screen 1)	1,749,143
Unsuitable for all methods of coal mining without exception (Screen 2)	201,269
Unsuitable for all or certain stipulated methods of coal mining with exception/stipulation (Screen 2)	1,258,897
Unacceptable for further consideration for leasing (Screen 3)	1,562,462
Unacceptable for further consideration for leasing (Screen 4)	489,619
Total Acceptable for Coal Leasing and Development	***144,877***
Total Unacceptable for Coal Leasing and Development	***1,604,266***

[1] See **Appendix A** for full coal screening results.
[2] There is overlap between the coal screens; acres are not additive.

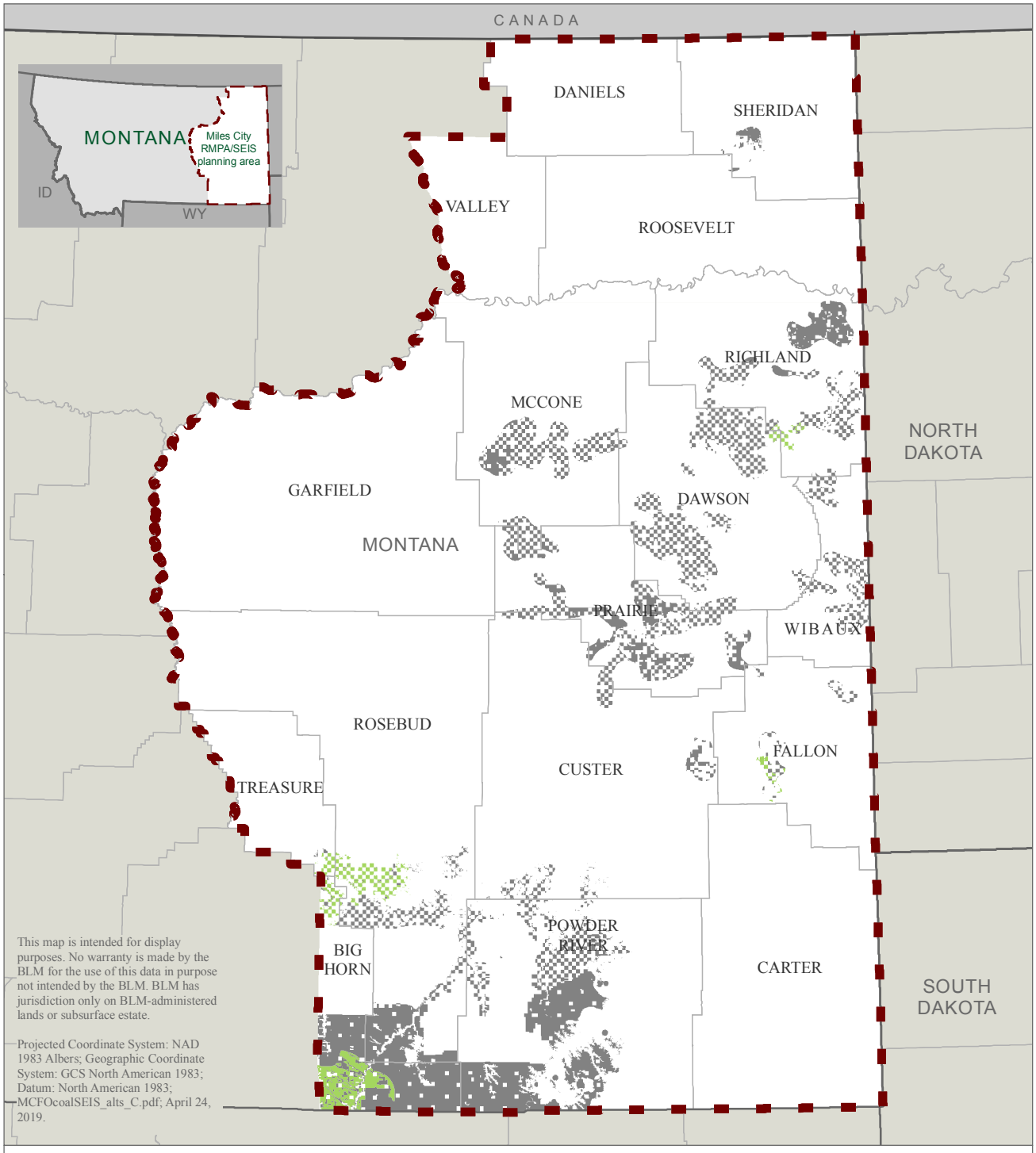

Figure 2-3
Alternative C: Areas Acceptable for Further Consideration for Leasing

2.2.6 Alternatives Considered but Eliminated from Further Study

NEPA requires federal agencies to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any that were not developed in detail (40 CFR 1502.14). Through comments on the proposed action, the public suggested alternative methods for achieving the purpose and need. Some of these alternatives were outside the scope of responding to the court's order. These suggested alternatives were considered but dismissed from detailed consideration for the reasons summarized below.

No Leasing Alternative

During scoping, several commenters suggested analyzing an alternative for no future leasing of coal. Closing the decision area to any future leasing of federal coal resources, even in areas where there are no identified resource conflicts, was considered but not brought forward for further analysis. The primary land use plan-level decision to be made regarding coal is identifying areas that are acceptable for further consideration for coal leasing and those that are not (BLM Land Use Planning Handbook H-1601-1, Appendix C). Although a land use planning-level decision could be made that precludes coal development throughout the planning area, the process undertaken to arrive at this land use plan allocation must be consistent with the federal regulations. Namely, the BLM is required to go through the coal screening process outlined in 43 CFR 3420 et. seq. to arrive at its decision on coal allocations.

As part of this process, there is a screen that removes lands that would conflict with resources of high value to the public from consideration for coal leasing. The comments during scoping that requested the analysis of a no leasing alternative failed to articulate why particular resources were of high public value and to explain how allocations made on behalf of specific resources are necessarily applicable across the entire decision area.

The policy detailed in 43 CFR 3420.1–4e explains the selectivity of resources that should drive such determinations of unsuitability. This is consistent with BLM Handbook 3420, which directs the BLM to prioritize energy development to support competitive energy markets and national energy objectives. The BLM's authorities are clear in their direction that coal unsuitability is based on protecting specific, high-value resources and does not balance unspecific resource concerns.

The above notwithstanding, the resource benefits that could be gained through a total leasing closure could be offset in large part by the resource impacts from the displacement of coal leasing on tribal, state, and private lands; the development of new infrastructure to support displaced activities; undesirable development outside federal estate; and the release of coal development from federally required mitigation, such as that provided through stipulations, best management practices, and avoidance measures. Collectively, there are a number of indirect costs; claims of the benefits of total closure have not given a reasonable basis for offsetting these costs or provide a benefit to making the decision area unavailable for leasing.

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CHAPTER 3
AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the existing biological, physical, and socioeconomic characteristics of the decision area, including human uses that could be affected, and it evaluates the impacts or effects of implementing the proposed alternatives. The 2015 Proposed RMP/Final EIS described the baseline conditions in the decision area (BLM 2015a; Chapter 3: *Affected Environment*). Because the 2015 Proposed RMP/Final EIS describes the baseline conditions in detail, this chapter incorporates those conditions by reference and provides updated descriptions of those resources that have new or updated information. **Chapter 1** includes a list of those resources considered but eliminated from further analysis.

3.2 METHODS AND ASSUMPTIONS

3.2.1 Analytical Assumptions

Several assumptions were made to facilitate the analysis of potential effects and to ensure that the analysis adhered to the federal district court's order. The majority of resources will apply assumptions identified in the 2015 Proposed RMP/Final EIS. Below are general assumptions that apply to all resources:

- Planning issues identified in **Chapter 1** and the court's order provide the focus for the scope of effects analyses in this chapter.
- All resources will use baseline data from the 2015 Proposed RMP/Final EIS unless updated information is identified.
- Unless otherwise indicated, most impacts analyses assume a 20-year time horizon.
- The impact analysis area for Alternatives B and C is the lands acceptable for further consideration for leasing within the three-county area of Richland, Rosebud, and Big Horn Counties (see **Figures 3-1** and **3-2**); it does not include the entire planning area from the 2015 Proposed RMP/Final EIS. For Alternative A, the impact analysis

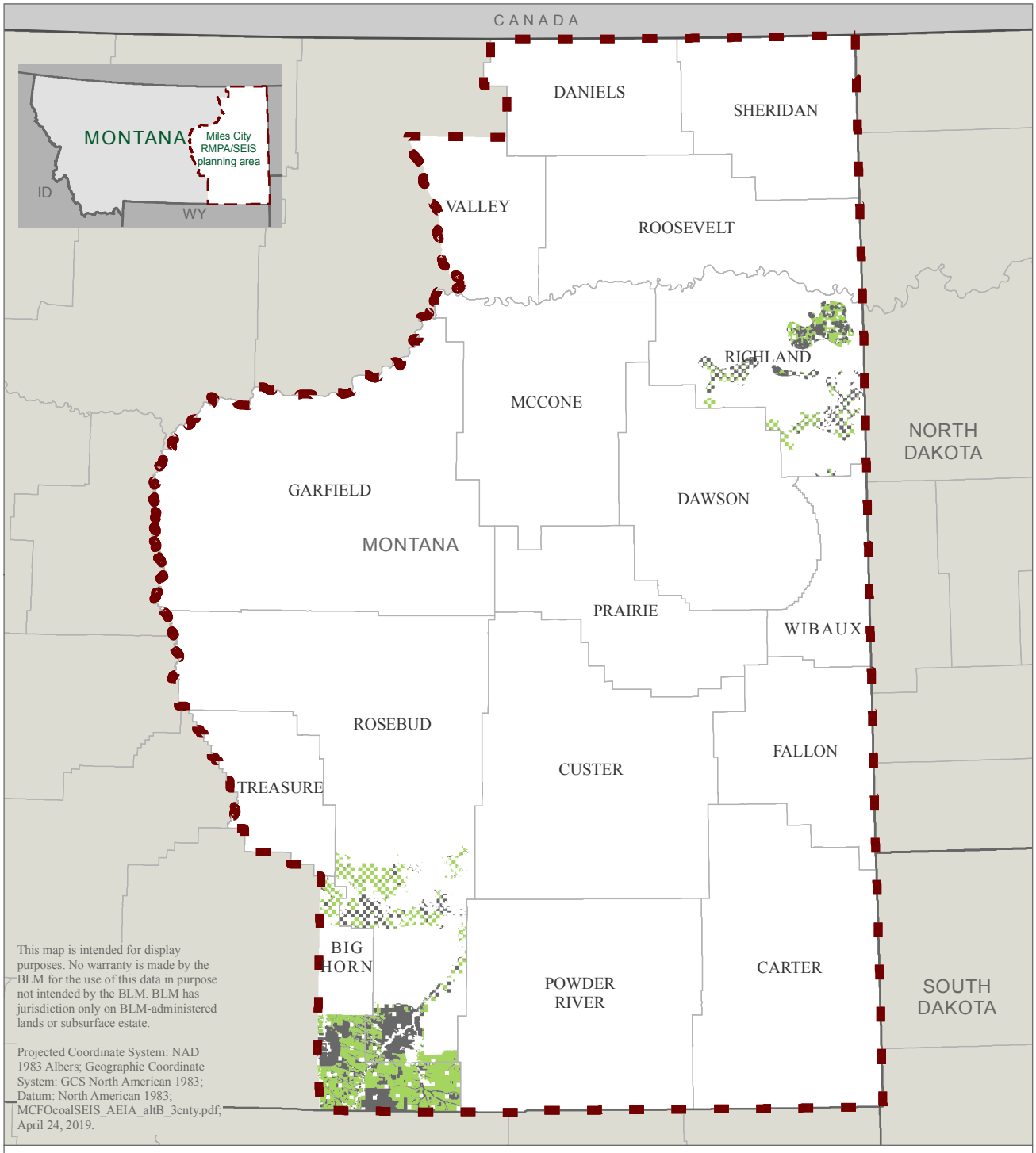


Figure 3-1
Alternative B:
Impact Analysis Area

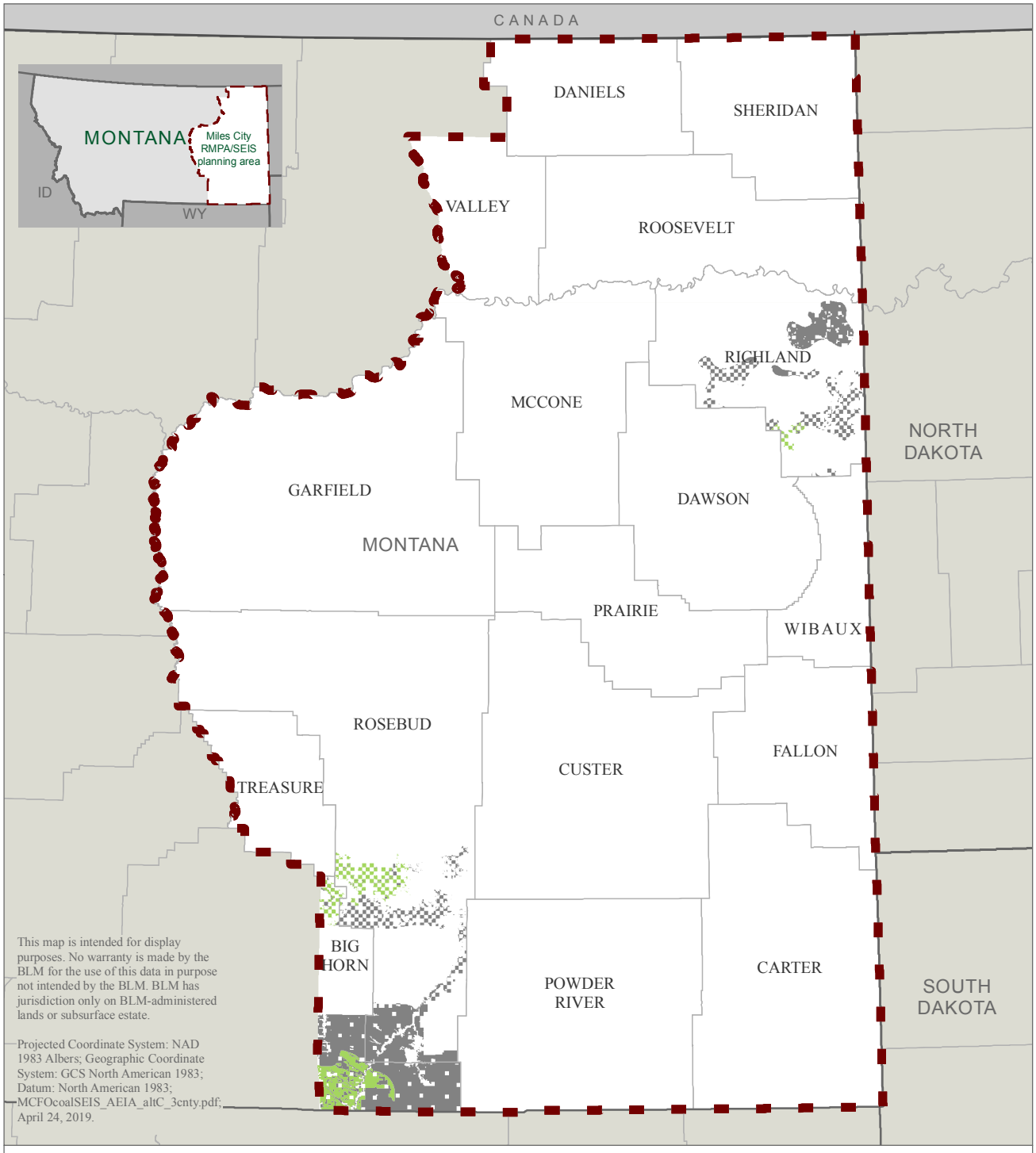


Figure 3-2
Alternative C:
Impact Analysis Area

area is the area acceptable for further consideration for coal leasing described in the 2015 Proposed RMP/Final EIS (BLM 2015a).

- The BLM forecasts approximately 775 million tons for mining in the MCFO with approximately 450 million tons of federal coal resources over the 20-year planning period.
- The BLM forecasts a total of approximately 9,730 acres of surface disturbance for coal development in the next 20 years based on current lease applications (detailed in the RFD scenario, **Appendix C**). Of this total, approximately 5,640 acres would be attributed to mining of federal coal resources. All mining-related disturbances would be limited to the three-county area of Big Horn, Rosebud, and Richland Counties. This level of disturbance would be the same under all alternatives, including the No Action Alternative (Alternative A).
- In accordance with 43 CFR 3461.2-1, the BLM could, based on additional site-specific surveys or changes in resource conditions, change the unsuitability determination of a given tract at the activity planning stage.
- Assumptions about specific resources, included below, are generally the same as those in the 2015 Proposed RMP/Final EIS. In some cases, they have been updated for clarity.
- Acre figures and other numbers used in the analysis are approximate projections for comparison and analytical purposes only.

3.2.2 Reasonably Foreseeable Development Scenario

The BLM MCFO updated the RFD scenario from the 2015 Proposed RMP/Final EIS. The revised RFD scenario represents forecasted coal production from four surface mining operations (Spring Creek Mine Complex, Rosebud Mine, Decker Mine, and Savage Mine) located in the decision area and one surface mine located outside the decision area, but within the MCFO planning area (Absaloka Mine), during the 2019–2038 term of the SEIS/RMPA. There are no underground mines in the planning area and based on the geology and economics, there are no reasonably foreseeable opportunities for underground mining in the planning area.

During the term of the SEIS/RMPA, the total forecasted production in the MCFO planning area is 775 million tons forecasted for mining in the MCFO decision area over the 20-year planning period with approximately 450 million tons of federal coal resources already leased for development.

The RFD scenario forecasted that 9,730 acres would be disturbed over the life of the plan while mining the forecasted 775 million tons of coal. The disturbance needed to mine federal coal resources would be proportional and equals approximately 5,640 acres.

The updated RFD scenario and forecast for coal production on federal coal (approximately 450 million tons and 5,640 acres of surface disturbance) will be used for all alternatives, including the No Action Alternative. At this scale of analysis, it is unknown where the disturbance would occur, but it would be limited to the three-county area of Rosebud, Big Horn, and Richland Counties near existing mines. See **Appendix C** for further information on the RFD scenario.

The RFD scenario is the same under all alternatives, including the No Action alternative, because the geographic scope for each alternative includes the areas forecasted for development from the existing permits and applications.

3.2.3 Types of Effects

The analysis considers direct, indirect, and cumulative effects, consistent with direction at 40 CFR 1502.16.

- Direct effects are caused by an action or by implementation of an alternative and occur at the same time and place as that action or implementation. For example, for the action of building a road, a direct adverse effect is surface disturbance. Surface disturbance is the effect of heavy equipment (the cause) removing existing vegetation, wildlife habitat, and topsoil as it grades the road location.
- Indirect effects also result from an action or implementation of an alternative, but usually occur later in time or removed in distance from the action or implementation. For the action of building a road, an indirect effect could occur days after the surface is disturbed and some distance from the disturbance. Heavy precipitation following the removal of vegetation and disturbance of the ground surface could erode soil and transport sediment into streams. This effect on stream-water quality would be considered indirect.
- Cumulative effects result from individually minor but collectively significant actions over time. A cumulative effect is the effect on the environment that results from the incremental effect of the federal action when added to other past, present, and reasonably foreseeable future actions, federal and nonfederal.

3.2.4 Cumulative Impacts

Cumulative Analysis Methodology

Cumulative impacts are effects on the environment that result from implementing any of the action alternatives, in combination with other actions outside the scope of this SEIS/RMPA. CEQ regulations (CEQ 1997) require a cumulative impact analysis because environmental conditions result from many different factors that act together. The total effect of any single action cannot be determined by considering it in isolation; it must be determined by considering the likely result of that action in conjunction with many other actions.

Past, Present, and Reasonably Foreseeable Future Actions

Evaluating potential impacts includes considering incremental impacts that could occur from the alternatives, as well as impacts from past, present, and reasonably foreseeable future actions. The decision area is fully contained within the area determined acceptable for further consideration for coal leasing in the 2015 Proposed RMP/Final EIS (BLM 2015a). See the 2015 Proposed RMP/Final EIS (BLM 2015a; *Cumulative Impacts,* pages 4-3 through 4-4) for a discussion of cumulative impact analysis methodology.

3.3 Air Resources, Including Greenhouse Gases and Climate Change

The BLM air resources program includes air quality, air quality-related values such as visibility and deposition, and greenhouse gases and climate change. Because the management actions

being evaluated in this SEIS/RMPA would not affect the air quality and air quality-related values analyses contained in the 2015 Proposed RMPA/Final EIS (BLM 2015a) and these were not the subject of the court order, the analysis here focuses on greenhouse gases and climate change.

3.3.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Climate – Affected Environment,* pages 3-2 through 3-4; and *Climate Change – Affected Environment*, page 3-4 through 3-12). More recent information as it pertains to the decisions for this SEIS/RMPA is included below.

The Intergovernmental Panel on Climate Change (IPCC) describes climate change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use" (IPCC 2013).

The IPCC states: "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased" (IPCC 2013). The global average surface temperature has increased approximately 1.5 degrees Fahrenheit (°F) from 1880 to 2012 (IPCC 2013). Warming has occurred on land surfaces, oceans, and other water bodies. It has also occurred in the troposphere, which is the lowest layer of the earth's atmosphere ranging from 4 to 12 miles above the surface within which all the weather phenomena we experience on a daily basis occur.

Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Although largely invisible to the short wavelength incoming solar radiation that heats the earth's surface, GHGs absorb a portion of the outgoing long wavelength infrared heat radiated back from the surface, preventing it from escaping out into space. As a result, the buildup of GHGs such as carbon dioxide, methane, and nitrous oxide since the start of the industrial revolution has increased the global mean temperature and begun to alter the earth's climate in complex ways.

This section analyzes the three main GHGs (carbon dioxide, nitrous oxide, and methane) associated with the production, transportation, and downstream combustion of coal, oil, and gas over the life of the SEIS/RMPA. The analysis responds to the GHG and climate change-related issues identified in the United States District Court, District of Montana, opinion and order (*Western Organization of Resource Councils, et al. v. BLM*) (see **Chapter 1**, Purpose and Need) and issues identified through scoping (see **Tables 1-1** and **1-2**). The court order requires the BLM to supplement the 2015 Proposed RMP/Final EIS analysis to evaluate the environmental consequences of the downstream combustion of coal, oil, and gas open to potential development (claim #3), justify the use of global warming potential (GWP) time horizons, and explain the evolving science in this area (claim #5).

The method the BLM used to supplement the GHG and climate change analysis is described below. **Section 2.2**, Alternatives Development, addresses coal screening and consideration of climate change impacts, which the BLM used to make a reasoned decision on the amount of recoverable coal made available in the SEIS/RMPA (claim #1).

Different GHGs have different atmospheric lifetimes. Some, such as methane (CH_4), react in the atmosphere relatively quickly (on the order of 12 years; see EPA 2018a); others, such as carbon dioxide (CO_2), typically last for hundreds of years or longer. GHGs also vary with respect to the amount of outgoing radiation absorbed by each gas molecule relative to the amount of incoming radiation it allows to pass through (i.e., its level of radiative forcing). A molecule of nitrous oxide (N_2O) is far more effective at absorbing outgoing radiation than a molecule of CO_2. The impact of a given GHG species on global warming depends both on its radiative forcing and how long it lasts in the atmosphere.

Climate scientists have calculated a GWP for each GHG that accounts for these effects. GWPs are calculated for each GHG species for a specified time interval (typically 20 or 100 years). By definition, the GWP for CO_2 is assigned a value of 1, and GWPs for other gases are defined relative to CO_2. In technical terms, GWP is the time-integrated direct (and potentially indirect) radiative forcing of an amount of a GHG species released instantaneously into the atmosphere relative to that of an equal amount of CO_2.

GWP values allow for an "apples-to-apples" comparison of the impacts of emissions of different GHGs. In particular, emissions of mixtures of different GHGs are typically summarized in terms of their CO_2 equivalent (CO_2e) emissions defined as the weighted sum of the emissions of each GHG where the weights are the GWPs. For example, emissions of the three most significant GHGs associated with fossil fuel combustion (CO_2, CH_4, and N_2O) are summarized as

$$CO_2e(MMT/year) = CO_2(MMT/year) + GWP_{CH4} \times CH_4(MMT/year) + GWP_{N2O} \times N_2O(MMT/year)$$

where MMT stands for million metric tons per year.

Because the GWP of a given GHG depends in part on the atmospheric lifetime of the GHG, GWP values depend on the time interval for which they are estimated. The GWP for a relatively short-lived GHG, such as CH_4, is larger over a short time period (for example, 20 years) as compared with a much longer time period (such as 100 years) because most of the CH_4 will have reacted away well before 100 years have passed. Conversely, very long-lived GHGs have a 20-year GWP that is lower than the 100-year GWP because the time integrated radiative forcing is less (relative to CO_2) over the shorter time interval.

As a result of various complex feedbacks in the earth-atmosphere system, GWPs can only be roughly estimated; according to the IPCC, GWPs typically have an uncertainty of ±35 percent (IPCC 2013). Estimates of GWPs have been updated over the years as the models used to calculate them have been refined and to reflect the changing composition of the atmosphere that impacts the GWP of each additional ton of GHG emissions. GWPs have been calculated for several GHGs over different time horizons, including 20 years, 100 years, and 500 years. The choice of time horizon depends on the type of application and policy context; hence, no single

time horizon is optimal for all policy goals. The United Nations Framework Convention on Climate Change and its Kyoto Protocol[1] adopted the 100-year GWP, and it is used widely as the default measure. For example, the EPA uses the 100-year time horizon in its annual GHG inventories. The EPA's most recent inventory (EPA 2019a) uses 100-year GWPs consistent with the IPCC Fifth Assessment Report (IPCC 2013).

This SEIS/RMPA reports CO_2e emissions using GWPs for the 100-year time horizon for consistency with the EPA's inventory as well as GWPs for the 20-year time horizon to more clearly estimate the relative impacts of shorter-lived GHGs (i.e., CH_4) over the 20-year life of the SEIS/RMPA. More information on specific GWPs and time horizons used for this analysis are provided in the section below on *Direct and Indirect Impacts, Analysis Methods*.

Physical Manifestations of Climate Change

Warming of the earth's climate since the industrial revolution has been observed to coincide with widespread effects throughout the earth-atmosphere system, including reductions in the extent and duration of polar sea ice and mountain winter snowpack, rising sea levels, increases in mean nighttime minimum temperatures, shifts in historical rainfall patterns, and changes in the frequency, severity, and duration of weather events. These effects, in turn, have affected natural and human systems regardless of cause, implicating the sensitivity of natural and human systems to changing climate (IPCC 2013).

Changes in climate and the potential effects of climate change were described in the 2015 Proposed RMP/Final EIS (pages 3-2 to 3-10). Since that time, the Fourth National Climate Assessment (NCA) was published in November 2018. It was written to help inform decision-makers, utility and natural resource managers, public health officials, emergency planners, and other stakeholders by providing a thorough examination of the effects of climate change in the United States (US Global Change Research Program 2018). The National Oceanic and Atmospheric Administration summarizes some of the key findings of the report by stating that the US is increasingly vulnerable to climate change. It further states that while societal responses to climate change have expanded, they are not yet at the scale needed to avoid substantial impacts (NOAA 2018). Compared with previous reports, the NCA provides greater detail on regional scales as impacts and adaptation tend to be realized at a more local level.

As reported in the NCA, climate model projections show a warmer future in the Northern Great Plains (Montana, Wyoming, North Dakota, South Dakota, and Nebraska) with conditions becoming consistently warmer in 2 to 3 decades and temperatures rising steadily toward the middle of this century, irrespective of the climate scenario modeled. The NCA relies on recent climate modeling scenarios developed by the integrated assessment modeling community, known as the Representative Concentration Pathways (RCP). The "lower scenario" assumes lower emissions and concentrations of GHGs and aerosols, and projects a lower change in radiative forcing by 2100. The "higher scenario" assumes a continued dependence on fossil fuels and higher GHG emissions and concentrations; it projects a larger change in radiative forcing by 2100.

[1] https://unfccc.int

For the Northern Great Plains, the NCA reports that temperature increases of 2° to 4°F projected by 2050 under the lower scenario are expected to increase the occurrence of both drought and heat waves; these projected trends would be greater under the higher scenario. The probability for more very hot days (those with maximum temperatures above 90°F) is expected to increase. There are projected to be many fewer cool days (those with minimum temperatures less than 28°F), with decreases of 30 days or more per year by mid-century.

The amount, distribution, and variability of annual precipitation are anticipated to change, with increases in winter and spring precipitation of 10 to 30 percent by the end of this century and a decrease in the amount of precipitation falling as snow under a higher scenario. Summer precipitation is expected to vary across the Northern Great Plains, ranging from no change under a lower scenario to 10 to 20 percent reductions under a higher scenario. Further, the frequency of heavy precipitation events is projected to increase, with an increase of about 50 percent in the frequency of 2-day heavy rainfall events by 2050 under the higher scenario. The amount falling in single-day heavy events is projected to increase 8 to 10 percent by mid-century depending on the scenario. While there is high confidence in future increases in temperature, uncertainties exist as to the degree of precipitation variability from year to year and within season (Conant et al. 2018).

The 2017 Montana Climate Assessment (Whitlock et al. 2017) is a report providing information on present-day climate as well as climate terminology, past climate trends, and future climate projections within Montana. Major findings from this report include:

- Annual average temperatures, including daily minimums, maximums, and averages, have risen across the state between 1950 and 2015. The increases range between 2.0 and 3.0°F.
- Average winter precipitation decreased by 0.9 inches, which can largely be attributed to natural variability and an increase in El Niño events, especially in the western and central parts of the state. A significant increase in spring precipitation (1.3 to 2.0 inches) also occurred during this period for the eastern part of the state.
- Montana is projected to continue to warm in all geographic locations, seasons, and under all emission scenarios throughout the twenty-first century. By mid-century, Montana temperatures are projected to increase by approximately 4.5 to 6.0°F.

GHG emissions are reported at a number of spatial scales, including globally, nationally, and at the state level. In addition to these scales,[2] GHG emissions from fossil fuels produced on federal lands and emissions reported in the three planning area counties are described below. A comparison of GHG emissions at differing scales provides context against which to compare emissions from a specific action, such as that being evaluated in this SEIS/RMPA.

The US Geological Survey (USGS) recently published a report on GHG emissions from extraction and use of fossil fuels produced on federal lands and GHG sinks (carbon storage by terrestrial ecosystems) on federal lands in the US (USGS 2018). In 2014, nationwide emissions

[2] See *Direct and Indirect Impacts*, *Analysis Methods* for the emission scales used for this analysis.

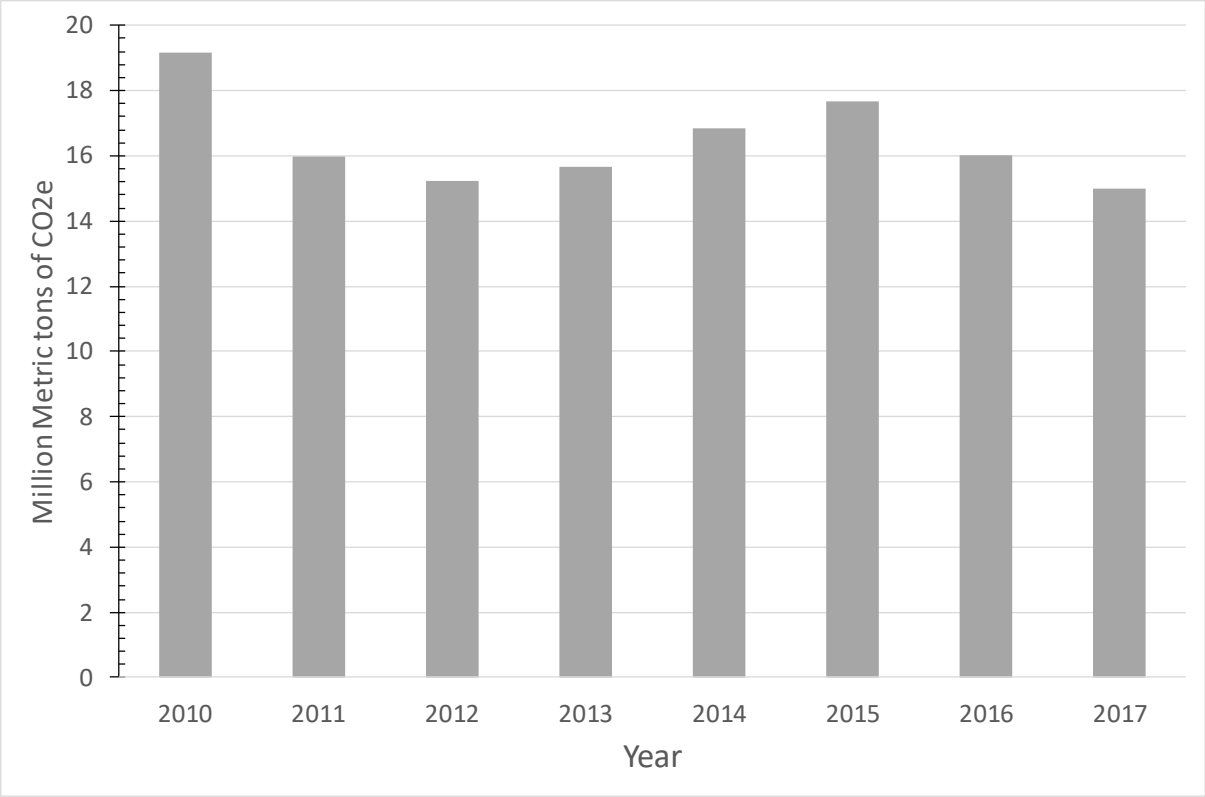
from fossil fuels (oil, gas, and coal) extracted from federal lands were 1,279.0 million metric tons (MMT) carbon dioxide equivalents (CO_2e) of carbon dioxide, 47.6 MMT CO_2e of methane, and 5.5 MMT CO_2e of nitrous oxide based on 100-year GWPs. GHG emissions from production and combustion of fossil fuels produced on federal lands in Montana were 42.1 MMT CO_2e of carbon dioxide (3 percent of total carbon dioxide emissions from all states and offshore areas combined) and 1.2 MMT CO_2e of methane (3 percent of total methane emissions from all states and offshore areas combined) (USGS 2018).

In 2014, carbon storage by terrestrial ecosystems on federal lands in the conterminous United States (not including Alaska and Hawaii) was 83,600 MMT CO_2e. Soils stored 63 percent of carbon, with vegetation and dead organic matter storing 26 percent and 11 percent, respectively. Between 2005 and 2014, the annual rate of net carbon uptake by terrestrial ecosystems in the conterminous US ranged from a sink (sequestration) of 475 MMT tons of CO_2e per year to a source (emission) of 51 MMT CO_2e per year. This was due to changes in climate/weather, land use, land cover change, wild fire frequency, and other factors. Terrestrial ecosystems on federal lands sequestered an average of 195 MMT CO_2e per year nationally between 2005 and 2014. In Montana, the annual average sequestration over the 10-year period was 19 MMT CO_2e per year, while emissions from wildfires averaged 1 to 2 MMT CO_2e per year. The 2014 net emission of GHGs for federal lands in Montana was 20.2 MMT CO_2e per year, indicating that more GHGs were emitted than were sequestered.

The EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT; EPA 2018a) database reports annual GHG emissions from facilities emitting more than 25,000 metric tons of CO_2e per year that are subject to the EPA's Greenhouse Gas Reporting Program (GHGRP) under 40 CFR 98. This includes emissions from most large, stationary sources of GHGs (smaller emitters are not required to report) and emissions from most end uses of fossil fuels. Nationally, the GHGRP accounts for 85 to 90 percent of total GHG emissions accounted for in the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks.[3] While CH_4 emissions from underground coal mines are included in the GHGRP, emissions from coal strip mines are not. GHG emissions reported under GHGRP by facilities in the 17 counties in the MCFO planning area for 2010–2017 are shown in **Diagram 3-1**. Total emissions in the 8-year period from 2010 to 2017 are the lowest in 2017.

[3] https://www3.epa.gov/climatechange/ghgemissions/inventoryexplorer/data_explorer_flight.html

Diagram 3-1. GHG Emissions in the 17 Planning Area Counties of the Miles City Field Office



Source: EPA 2018a

3.3.2 Direct and Indirect Impacts

Analysis Methods

This section analyzes the three main GHGs (carbon dioxide, nitrous oxide, and methane) associated with the production, transportation, and downstream combustion of coal, oil, and gas over the life of the SEIS/RMPA. The analysis responds to the GHG- and climate change-related issues identified in the United States District Court, District of Montana, opinion and order (*Western Organization of Resource Councils, et al. v. BLM*) and issues identified through scoping. Details of the methodology used to supplement the GHG and climate change analysis in response to the court's decision for coal, oil, and gas resources are described below. As noted above, coal screening and consideration of climate change impacts to make a reasoned decision on the amount of recoverable coal made available in the SEIS/RMPA (claim #1) are addressed in **Section 2.2**, Alternatives Development.

Coal

Emissions of GHGs are quantified for the estimated future production, transportation, and downstream combustion of federal coal developed within the planning area over the life of the plan. GHG emissions for coal production on federal lands are calculated from the emissions factors for coal mining equipment reported in the 2015 Proposed RMP/Final EIS (BLM 2015a)

and the BLM RFD scenario forecast for 2019 through 2038 (**Appendix C**).[4] In particular, the federal emissions estimates on a unit-production basis (ton/ton of coal production) from the 2015 Proposed RMP/Final EIS Air Resources Technical Support Document for CO_2, CH_4, and N_2O were used along with the current RFD to estimate production equipment GHG emissions for each year during the 2019–2038 planning period. The RFD forecast prepared by the BLM included federal and nonfederal annual coal production for each of the five mines in the planning area. Methane emissions from coal off gassing were calculated using the default emissions factor for surface mines in EPA's *State Inventory and Projection Tool*[5] for Montana and the RFD coal production forecasts.

The BLM estimated transportation emissions for the transport of produced coal via rail using diesel locomotives in areas that do not have "mine-to-mouth" operations. The BLM assumed an average one-way train haul distance of 1,500 miles and calculated emissions using the RFD-predicted annual tons of coal. The BLM conservatively based average train haul distance in miles on the farthest distance that coal would be transported by rail from any of the three mines (Absaloka, Decker, and Spring Creek) and determined from an internet search of railway miles from the Burlington Northern Santa Fe by the BLM MCFO. The BLM based emissions calculations on emission factors developed using data from the Burlington Northern Santa Fe Railway and EPA.

Burlington Northern Santa Fe developed a fuel efficiency factor for diesel locomotives of 849 ton-miles per gallon in its 2017 Corporate Responsibility and Sustainability Report (Burlington Northern Santa Fe 2017). The EPA provided emission factors for diesel locomotives of 20.9 pounds per gallon for CO_2, 0.0018 pounds per gallon for CH_4, and 0.0006 pounds per gallon for N_2O as presented in the Greenhouse Gas Inventory Guidance, Direct Emissions from Mobile Combustion Sources, January 2016 (EPA 2016). To account for the reduced load on the return trip when the coal cars are typically empty, the BLM estimated fuel consumption at 21.8 percent of the outbound (loaded) fuel consumption based on the ratio of the total weight of the unloaded train to that of the loaded train (American Association of Railroads 2018; Burlington Northern Santa Fe 2019).

Downstream emissions from federal and nonfederal coal combustion are determined using GHG emissions factors for stationary combustion of sub-bituminous coal from the EPA Emission Factors for Greenhouse Gas Inventories, March 2018 (EPA 2018b). The emission factor for sub-bituminous coal was used because more than 99 percent of coal produced within the planning area is sub-bituminous. The emission factors used for CO_2, CH_4, and N_2O are 1,676 kilograms per short ton, 190 kilograms per short ton, and 28 kilograms per short ton, respectively.

The GHG emissions for production, transportation, and combustion are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). This is

[4] In the 2015 Proposed RMP/Final EIS, CH_4 emissions from coal production were estimated as 0.0006 percent of engine CO_2 emissions; N_2O emissions were estimated as 0.001 percent of engine CO_2 emissions (*Air Resource Technical Support Document [ARTSD] for Emission Inventories, Near-Field Modeling, and Visibility Screening*, p. A-79).
[5] https://www.epa.gov/statelocalenergy/state-inventory-and-projection-tool

because the same RFD was used in all three alternatives. GHG emissions are adjusted to use GWP values based on both 20- and 100-year time horizons to calculate carbon dioxide equivalents (see **Table 3-1** for a description of the GWPs and scientific relevance of these two time horizons). The BLM selected 100-year GWPs so that emissions reported here can be directly compared with emission inventories compiled by the EPA (EPA, 2019a), which use these same GWPs, and to evaluate the relative long-term effect of emissions. The BLM selected 20-year GWPs to better evaluate near-term impacts of methane emissions over the life of the RMP CO_2 (see discussion under *Affected Environment* above). GWPs for other time horizons are not readily available and are not commonly used in the climate change community. Other emissions weighting metrics, such as the global temperature change potential (IPCC 2013) are not commonly used for reporting GHG emissions. Evaluations of the relative importance of emissions of short-lived GHG species relative to CO_2 are sensitive to the particular metric used, which should be carefully selected to match the specific policy question being addressed.

Table 3-1
GWPs for 100-Year and 20-Year Time Horizons and Rationale

Time Horizon	GWP[1]			Rationale for Time Horizon
	CO_2	CH_4	N_2O	
100-Year	1	28	265	Adopted by the United Nations Framework Convention on Climate Change and its Kyoto Protocol and used widely as the default metric; used by the EPA in its GHG Inventories and GHG Reporting Rule requirements under 40 CFR 98(A); consistent with the IPCC Fifth Assessment Report in its science communications.
20-Year	1	84	264	Prioritizes gases with shorter lifetimes, such as CH_4, because it does not consider impacts that happen more than 20 years after the emissions occur. Because all GWPs are calculated relative to CO_2, GWPs based on a shorter time frame will be larger for gases with lifetimes shorter than that of CO_2, and smaller for gases with lifetimes longer than CO_2.

Source: [1]IPCC 2014

The state, national, and global emission totals of GHGs (see **Table 3-2**) are compared with the potential direct and indirect impacts of coal mining on federal lands in the MCFO. A comparison with other metrics is provided for additional context.

Table 3-2
GHG Emissions (CO_2e) at Various Scales

Scale	Emissions	Source
Montana	20.1 million metric tons/year (2017)	EPA 2018a
National	6,457 million metric tons/year (2017)	EPA 2019a
Global	52 gigatons/year (2010)	IPCC 2014

Oil and Gas

GHG emissions are quantified for production and downstream combustion of oil, conventional natural gas, and coalbed natural gas (CBNG). The annual production estimates for 2019 to 2030 are the same as the fluid minerals production forecast under Alternative E in the 2015 Proposed

RMP/Final EIS (BLM 2015a). GWP values that reflect 20- and 100-year time horizons (see **Table 3-1**) are used to obtain CO_2e emissions.

Annual oil and gas production forecast estimates are also used to form the basis of the emissions estimates for downstream combustion of oil and gas. Oil and gas combustion emissions are quantified using the EPA GHG emission factors for stationary source combustion of No. 2 fuel oil and natural gas, respectively. GHG emissions due to transportation of oil and gas from the planning area are qualitatively discussed.

The GHG emissions quantified for production and combustion are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). This is because the same RFD is used in all three alternatives. GHG emissions are reported using both 100-year and 20-year GWPs for reasons noted in the above discussion of coal. State, national, and global emission totals of GHGs from the EPA FLIGHT data (EPA 2018a), the EIA 2019 Annual Energy Outlook (EIA 2019), and the IPCC Fifth Assessment Report (IPCC 2014) are reported for comparison with the potential direct and indirect impacts of oil and gas development and production from federal minerals within the MCFO planning area (see **Table 3-2**). A comparison with other metrics is provided for additional context.

Assumptions

- The BLM prepared the RFD forecast for 2019 through 2038 (**Appendix C**), which includes federal and nonfederal annual coal production forecasts within the planning area. It was used to estimate annual emissions from coal production, transportation, and downstream combustion.
- On average over the 2019– 038 RFD forecast period, 83 percent of coal from mines in the planning area would be transported by diesel rail locomotives over an average distance of 1,500 miles one way. The BLM conservatively based the distance on the farthest distance that coal would be transported by rail from any of the planning area mines; this was determined by the BLM MCFO from a Burlington Northern Santa Fe Railway miles internet search. Fuel consumption to return empty coal railcars is 21.8 percent of the outbound loaded fuel consumption.
- All future coal produced is combusted in US energy generating units.
- Oil and gas production rates were based on year 20 producing-well counts and average per well production that were used to estimate production GHG emissions in the 2015 Proposed RMP/Final EIS, Alternative E (BLM 2015a).

Indicators

- MMT of CO_2, CH_4, and N_2O and the resulting CO_2e from coal production, transportation, and downstream combustion over the life of the RMP
- MMT of CO_2, CH_4, and N_2O and resulting CO_2e from oil and gas production, and downstream combustion over the life of the RMP
- GHG emissions from coal, oil, and gas as a percentage of state, national, and global emissions and other metrics
- GHG emission equivalencies from power plants and wind turbines

Impacts Common to all Alternatives

Coal

Table 3-3 summarizes GHG emissions from federal coal production, transportation, and downstream combustion for each forecast year. The details by pollutant (CO_2, CH_4, and N_2O) are shown in **Appendix B**.

Table 3-3
GHG Emissions as CO_2e from Federal Coal Production, Transportation, and Combustion based on 20-year and 100-year GWPs

Year	Federal RFD Coal Production (MMst)	CO_2e (MMT, 20-year GWP)				CO_2e (MMT, 100-year GWP)			
		Production (MMT)	Transportation (MMT)	Combustion (MMT)	Total (MMT)	Production (MMT)	Transportation (MMT)	Combustion (MMT)	Total (MMT)
2019	18.48	1.40	0.18	31.40	32.98	0.49	0.18	31.21	31.88
2020	25.44	1.92	0.28	43.23	45.43	0.67	0.28	42.96	43.91
2021	25.26	1.91	0.28	42.93	45.12	0.67	0.28	42.67	43.61
2022	24.60	1.86	0.28	41.80	43.94	0.65	0.28	41.54	42.47
2023	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2024	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2025	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2026	23.93	1.81	0.28	40.67	42.76	0.63	0.28	40.41	41.32
2027	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2028	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2029	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2030	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2031	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2032	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2033	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2034	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2035	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2036	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2037	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
2038	21.61	1.63	0.25	36.72	38.61	0.57	0.25	36.50	37.31
Total	**345.76**	**33.93**	**5.12**	**762.73**	**801.78**	**11.82**	**5.10**	**757.96**	**774.88**
Average	**22.07**	**1.70**	**0.26**	**38.14**	**40.09**	**0.59**	**0.25**	**37.90**	**38.74**

RFD: Reasonable Foreseeable Development
MMst: million short tons
MMT: million metric tons

The GHG emissions discussed above would contribute incrementally to global climate change. The lack of precise scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change at local scales limits the ability to quantify accurately the potential future impacts of climate change in the planning area. Furthermore, potential impacts on climate change

are influenced by GHG emission sources from around the world; it is not possible to accurately distinguish the impacts on global climate change from GHG emissions originating just from the planning area. Instead, the GHG emissions due to the federal action are compared with state, national, and global GHG emissions along with other metrics.

Total GHG emissions from federal coal production, transportation, and downstream combustion shown in **Table 3-3,** over the 20-year RMP lifetime, based on 20-year and 100-year GWPs are 802 MMT CO_2e and 775 MMT, respectively. The downstream combustion portion is 763 MMT and 758 MMT, respectively.

Average annual GHG emissions from federal coal production within the planning area, shown in **Table 3-3,** are 1.7 MMT CO_2e and 0.59 MMT CO_2e for 20-year and 100-year GWPs, respectively. These represent 8.5 percent and 2.9 percent, respectively, of the 20.1 MMT CO_2e total Montana GHG emissions for major facilities in 2017 as reported in the EPA FLIGHT data (EPA 2018a).

Average annual GHG emissions from federal coal production, transportation, and downstream combustion, shown in **Table 3-3**, are 40.1 MMT CO_2e and 38.7 MMT CO_2e for 20-year and 100-year GWPs, respectively. When compared with US GHG emissions, these represent 0.62 percent and 0.60 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (EPA 2019a). When compared with worldwide GHG emissions, these represent 0.08 percent and 0.07 percent, respectively, of the 52 gigatons total 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions due to production, transportation, and downstream combustion of coal forecast to be produced in the MCFO (using the 100-year GWP) are equivalent to the following, based on the EPA Greenhouse Gas Equivalencies Calculator (EPA 2019b):

- GHG emissions from 10 coal-fired power plants in one year
- GHG emissions avoided by 8,209 wind turbines running for one year

The corresponding numbers based on the 20-year GWP are 10 coal-fired power plants and 8,495 wind turbines.

Oil and Gas

Tables 3-4, **3-5**, and **3-6** summarize GHG emissions from the production and downstream combustion of federal oil, conventional natural gas, and coalbed natural gas, respectively. The details by pollutant (CO_2, CH_4, and N_2O) are shown in **Appendix B**. Oil and gas production estimates are identical in each year because they are based on the year 20 producing-well counts and average per well production in the 2015 Proposed RMP/Final EIS; the production is estimated from the product of these two quantities. This is likely a conservatively high estimate of annual production because the number of producing wells will be somewhat lower during the first few years.

Table 3-4
GHG Emissions as CO_2e from Federal Oil Production and Combustion based on 20-year and 100-year GWPs

Year[a]	Federal RFD Oil Production Rate (MMBO[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2020	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2021	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2022	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2023	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2024	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2025	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2026	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2027	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2028	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2029	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2030	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2031	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2032	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2033	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2034	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2035	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2036	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2037	3.0	77,624	137,641	215,265	62,600	134,715	197,315
2038	3.0	77,624	137,641	215,265	62,600	134,715	197,315
Total	**60.0**	**1,552,488**	**2,752,811**	**4,305,299**	**1,252,003**	**2,694,306**	**3,946,309**
Average	**3.0**	**77,624**	**137,641**	**215,265**	**62,600**	**134,715**	**197,315**

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Million barrels of oil

GHG emissions of CO_2, CH_4, and N_2O also would result from transportation of oil and gas from the planning area by pipeline, rail, or tanker truck. However, the BLM does not have readily available data on how the transport of liquid and gaseous fossil fuels are distributed among the forms of transportation (pipeline, rail, and tanker truck), or the quantity distributed to each type, in order to quantify emissions that would be representative of actual or reasonably foreseeable future operations. These GHG emissions attributable to the transport of oil and gas produced from the planning area would occur in the form of CO_2, CH_4, and N_2O.

The BLM has estimated GHG emissions attributable to the end use of the produced liquid and gaseous fossil fuels by assuming that 100 percent is combusted for heat or energy production. Although the actual end use of these products also may include transportation fuels; feedstocks

for plastics, chemical, and synthetic materials production; or other manufacturing, it is reasonably foreseeable to estimate emissions from combustion.

As in the case of coal production, the GHG emissions discussed above due to oil and gas production and combustion would contribute incrementally to global climate change, although at a much lower level relative to the coal production, transportation, and combustion. As noted previously, the lack of precise scientific tools (models with sufficient spatial and temporal resolution) to forecast climate change at local scales limits the ability to accurately quantify the future impacts on climate change in the planning area. Furthermore, potential impacts on climate change are influenced by GHG emission sources from around the world; it is not possible to accurately distinguish the impacts on global climate change from GHG emissions originating from just the planning area. Instead, the GHG emissions due to the federal action are compared with state, national, and global GHG emissions, along with other metrics.

Total GHG emissions from federal oil production and downstream combustion (see **Table 3-4**) over the 20-year RMP lifetime are based on 20-year and 100-year GWPs. They are 4.3 MMT CO_2e and 3.9 MMT, respectively. Downstream combustion contributes 2.8 MMT and 2.7 MMT, respectively.

The average annual production emissions in the planning area are based on 20-year and 100-year GWPs. They represent 0.4 percent and 0.3 percent, respectively, of the 20.1 MMT total Montana GHG emissions in CO_2e for major facilities in 2017, as reported in the EPA FLIGHT data (EPA 2018a).

Average annual GHG emissions from the production and downstream combustion of federal oil produced in the MCFO (see **Table 3-4**) are 215,265 metric tons CO_2e and 197,315 metric tons CO_2e using 20-year and 100-year GWPs, respectively. When compared with US GHG emissions, these represent 0.003 percent and 0.003 percent, respectively, of the 6,457 MMT CO2e total 2017 US GHG emissions reported by the EPA (2019a). When compared with worldwide GHG emissions, these represent 0.00041 percent and 0.00038 percent, respectively, of the 52-gigaton 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions reported above using the 100-year GWP are equivalent to the following based on the EPA Greenhouse Gas Equivalencies Calculator (EPA 2019b):

- 0.051 coal-fired power plant GHG emissions in one year (i.e., one power plant running for 19 days)
- GHG emissions avoided by 42 wind turbines running for one year

The corresponding numbers, based on the 20-year GWP, are 0.055 coal-fired power plant GHG emissions (i.e., one power plant running for 20 days) and 46 wind turbines.

Total GHG emissions from federal natural gas production and downstream combustion (total of conventional natural gas and CBNG production and combustion) are shown in **Tables 3-5** and **3-6** over the 20-year RMP lifetime. They are based on 20-year and 100-year GWPs and are 15.3 MMT CO_2e and 15.1 MMT CO_2e, respectively. Downstream combustion represents 14.3 MMT CO_2e and 14.3 MMT CO_2e, respectively.

Table 3-5
GHG Emissions as CO_2e from Federal Conventional Natural Gas Production and Combustion, Based on 20-year and 100-year GWPs

Year[a]	Federal RFD Natural Gas Production (BCF[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2020	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2021	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2022	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2023	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2024	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2025	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2026	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2027	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2028	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2029	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2030	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2031	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2032	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2033	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2034	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2035	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2036	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2037	5.1	23,832	278,765	302,598	19,528	278,471	297,999
2038	5.1	23,832	278,765	302,598	19,528	278,471	297,999
Total	**102.0**	**476,648**	**5,575,308**	**6,051,956**	**390,550**	**5,569,424**	**5,959,974**
Average	**5.1**	**23,832**	**278,765**	**302,598**	**19,528**	**278,471**	**297,999**

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Billion cubic feet

Table 3-6
GHG Emissions as CO_2e from Federal Coalbed Natural Gas Production and Combustion, Based on 20-year and 100-year GWPs

Year[a]	Federal RFD Natural Gas Production (BCF[b])	CO_2e (20-year GWP)			CO_2e (100-year GWP)		
		Production (metric tons)	Combustion (metric tons)	Total (metric tons)	Production (metric tons)	Combustion (metric tons)	Total (metric tons)
2019	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2020	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2021	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2022	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2023	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2024	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2025	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2026	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2027	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2028	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2029	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2030	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2031	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2032	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2033	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2034	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2035	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2036	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2037	8.0	25,289	435,471	460,761	19,765	435,012	454,777
2038	8.0	25,289	435,471	460,761	19,765	435,012	454,777
Total	**160.0**	**505,789**	**8,709,428**	**9,215,217**	**395,295**	**8,700,236**	**9,095,530**
Average	**8.0**	**25,289**	**435,471**	**460,761**	**19,765**	**435,012**	**454,777**

[a]Values are identical for each year because only a single RFD scenario is available for the MCFO RMP (see text).
[b]Billion cubic feet

The average annual production emissions in the planning area based on 20-year and 100-year GWPs represent 0.2 percent and 0.2 percent, respectively, of the 20.1 MMT CO_2e total Montana GHG emissions for major facilities in 2017, as reported in the EPA FLIGHT data (EPA 2018a).

The average annual GHG emissions from federal natural gas production and downstream combustion (total of conventional natural gas and CBNG production and combustion) are shown in **Tables 3-5** and **3-6**. They are 0.76 MMT CO_2e and 0.75 MMT CO_2e using 20-year and 100-year GWPs, respectively. These values represent 0.012 percent and 0.012 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (2019a).

The average annual GHG emissions combined from production and downstream combustion of federal oil and gas developed in the MCFO (**Tables 3-4** to **3-6**) are 0.98 MMT CO_2e and 0.95 MMT CO_2e using 20-year and 100-year GWPs, respectively. When compared with US GHG

emissions, these values represent 0.015 percent and 0.015 percent, respectively, of the 6,457 MMT CO_2e total 2017 US GHG emissions reported by the EPA (EPA). When compared with worldwide GHG emissions, these represent 0.0015 percent and 0.0014 percent, respectively, of the 52-gigaton 2010 global GHG emissions in CO_2e estimated by the IPCC (IPCC 2014).

The average annual GHG emissions estimated above using the 100-year GWP are equivalent to the following based on the EPA Greenhouse Gas Equivalencies Calculator (2019b):

- 0.244 coal-fired power plant GHG emissions in one year (i.e., one power plant running for 89 days)
- GHG emissions avoided by 201 wind turbines running for one year

The corresponding numbers based on the 20-year GWP are 0.252 coal-fired power plants (i.e., one power plant running for 89 days) and 208 wind turbines.

3.3.3 Cumulative Impacts

Cumulative impacts are evaluated from the total production of federal and nonfederal coal, oil, and gas within the planning area as well as other past, present, and reasonably foreseeable sources of reportable GHG emissions. GHG emissions from the production, transportation, and downstream combustion of coal forecast to be produced on nonfederal lands in the planning area are evaluated following methods similar to those described above using EIA 2019 nonfederal coal production forecasts for the plan period. GHG emissions from the production and downstream combustion of oil and gas forecast to be developed from nonfederal minerals in the planning area, as described in the 2015 Proposed RMP/Final EIS (BLM 2015a), were assessed using methods similar to those described for federal oil and gas above. GWP values for both 20- and 100-year time horizons were used (see **Table 3-1**).

Direct and indirect emissions from nonfederal coal, oil, and gas were combined with direct and indirect emissions from federal coal, oil, and gas, as described above. These emission totals were also combined with emissions from large sources other than coal mining and oil and gas development and production in the planning area for the most recent year (2017) EPA FLIGHT data.

Table 3-7 shows the cumulative effects in terms of GHG emissions from the sources listed above. These include GHG emissions in the planning area. Examples are federal and nonfederal coal and oil and gas and other major sources, as well as downstream combustion emissions outside the area resulting from coal and oil and gas developed in the area.

Table 3-7
GHG Emissions as CO_2e from Cumulative Sources Based on 20-year and 100-year GWPs

Production	Emissions	GHG Emissions in CO_2e (MMT/year)	
		20-year GWP	100-year GWP
Federal coal production (average over planning period 22.4 MMst/year	GHG emissions from federal coal production (average)	1.7	0.6
	GHG emissions from federal coal transportation (average)	0.3	0.3
	GHG emissions from federal coal combustion (average)	38.1	37.9
Nonfederal coal production (average) 16.3 MMst/year	GHG emissions from nonfederal coal production (average)	1.3	0.5
	GHG emissions from nonfederal coal transportation (average)	0.2	0.2
	GHG emissions from nonfederal coal combustion (average)	27.6	27.4
Federal oil production (average) 3.0 MMBO/year	GHG emissions from federal oil production (average)	0.1	0.1
	GHG emissions from federal oil combustion (average)	0.1	0.1
Federal production of conventional and coalbed natural gas (average) 13.1 BCF/year	GHG emissions from federal gas production (average)	0.1	0.1
	GHG emissions from federal gas combustion (average)	0.7	0.7
Nonfederal oil production (average) 20.6 MMBO/year	GHG emissions from nonfederal oil production (average)	0.5	0.4
	GHG emissions from nonfederal oil combustion (average)	0.9	0.9
Nonfederal production of conventional and coalbed natural gas (average) 45 BCF/year	GHG emissions from nonfederal gas production (average, MMT/year)	0.5	0.4
	GHG emissions from nonfederal gas combustion (average)	2.5	2.5
Other cumulative GHG emission sources	GHG emissions from other major sources in 2017 in planning area from FLIGHT (EPA 2018a)*	0.8	0.8
Cumulative GHG emissions in CO_2e (annual average over plan period)	-	**75.4**	**72.8**

All numbers shown are annual average over the planning period except for FLIGHT data
MMst = million short tons; MMT = million metric tons; MMBO = million barrels of oil; BCF = billion cubic feet
Cumulative totals may not add up due to rounding.
* The FLIGHT data shown exclude Colstrip and Lewis & Clark power plants, which are already accounted for in the downstream combustion category.

3.3.4 Summary

GHG emissions from the production and downstream combustion of coal, oil, and conventional and coalbed natural gas under the RMP were calculated using 100-year and 20-year GWPs to represent GHG impacts over the longer-term 100-year time span used in the EPA's national GHG inventory and the shorter 20-year life of the RMP for comparison, respectively. GHG emissions from coal transportation were also quantified. GWP values selected for this analysis

represent the most current widely recognized and widely used estimates in the climate science community. Differences in CO_2e emissions between the two time horizons mostly reflect the short atmospheric lifetime of methane relative to carbon dioxide and nitrous oxide. As a result, the differences are largest for sources such as coal production with relatively large ratios of methane to carbon dioxide emissions.

Coal, oil, and gas production, and therefore GHG emissions, are the same under the No Action Alternative (Alternative A) and the action alternatives (Alternatives B and C). Average annual GHG emissions over the SEIS/RMPA plan period for coal, oil, and gas are compared for federal and nonfederal resources and with other cumulative sources in **Table 3-8**. Cumulative annual average emissions (total CO_2e) are 75.4 MMT/year and 72.8 MMT/year using the 20-year and 100-year time horizon GWPs, respectively. These values represent 1.1 percent and 0.1 percent of total 2017 national and 2010 global annual CO_2e emissions, respectively, based on the 100-year time horizon values. They will contribute to the climate change impacts described above under *Affected Environment*.

Over the 20-year life of the plan, RMP sources will release 1,508 and 1,456 MMT CO_2e for 20-year and 100-year time horizon GWPs, respectively. Approximately three-fourths of emissions from the RFD are associated with nonfederal resources. Other cumulative sources in the planning area contribute just over 1 percent of total emissions. Downstream combustion is the dominant source of GHGs for coal and gas; combustion CO_2e emissions account for 93 percent of the RFD (action) emissions (see **Table 3-8**).

By 2038, global GHG emissions are estimated to be between approximately 30 to 80 gigatons of CO_2e annually under the IPCC lower-bound and higher-bound Representative Concentration Pathways (RCP 2.6 and RCP 8.5), respectively (IPCC 2014). Cumulative annual average emissions over the plan period will then represent between 0.2 percent and 0.1 percent of the global emissions under different future global representative concentration scenarios and will contribute, in part, to the climate change impacts described above under *Affected Environment*.

Table 3-8
Summary of Annual Average GHG Emissions from Coal, Oil, and Gas Production, Transport, and Downstream Combustion over the 20-year Life of the MCFO SEIS/RMPA RFD

Source	CO_2e MMT/year (20-year GWPs)	CO_2e MMT/year (100-year GWPs)
Federal Action Total	41.1	39.7
Nonfederal Total	33.5	32.3
Other Cumulative Sources in the SEIS/RMPA planning area	0.8	0.8
Grand Total (Annual Average over Plan Period)	75.4	72.8

3.4 WATER RESOURCES

3.4.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Water Resources – Affected Environment,* pages 3-25 through 3-37). A summary as it pertains to the decisions for this SEIS/RMPA is included below.

The coal development potential areas are located in the Tongue River and Powder River watersheds, in the southwest section of the MCFO boundary, and the Yellowstone River watershed, which is located upstream from the confluence of the Yellowstone River and the Missouri River. These areas include smaller perennial streams, intermittent streams, and ephemerals streams; in the planning area, more than 97 percent of stream miles are intermittent and ephemeral.

Geology for the coal development potential areas consists primarily of Tertiary bedrock, Quaternary alluvium, and Quaternary glacial till. These parent materials tend to form highly erosive, fine-grained soils. Streambeds typically consist of sand and silt, with few bedrock channels. Stream morphology and stability are dependent on the presence and type of riparian vegetation due to the lack of control structures (rocks, cobbles, and bedrock).

3.4.2 Direct and Indirect Impacts

Analysis Methods

This analysis focuses on the impacts of coal leasing and development on municipal watersheds. Perennial streams and riparian and wetland areas were made unacceptable for further consideration for coal leasing through the multiple-use screen in the action alternatives; therefore, there would be no impacts on those areas under the action alternatives. Impacts under Alternative A are as described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Water Resources – Environmental Consequences [Alternative E]*, page 4-69).

Similarly, 100-year floodplains (unsuitability criterion 16) and alluvial valley floors (unsuitability criterion 19) are unsuitable for coal mining without exception. These areas total 4,230 acres and 53,990 acres, respectively, in the three-county area of forecasted disturbance. Because these areas are unsuitable for coal mining without exception, they would be protected from coal development in the action alternatives and are not carried forward for additional analysis. Impacts under Alternative A are as described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Water Resources – Environmental Consequences [Alternative E]*, page 4-69).

Finally, national resource waters (unsuitability criterion 18) are not present in the decision area, so these are also not carried forward for detailed analysis.

Assumptions

- Waterbodies include all surface water (for example, rivers, streams, creeks, coulees, springs, reservoirs, lakes, ponds, wetlands, and canals).
- Surface disturbance, especially in areas with highly erosive soils, can affect surface water quality by increasing sediment transported to small drainages and ultimately to larger streams during runoff events.

- The BLM will help state agencies ensure that they meet or exceed state rules and regulations by reviewing permitting information submitted as part of BLM actions; but, it does not have the authority to enforce state regulations or assume liability in cases where state water standards are not met by parties involved in BLM actions.
- Effects conclusions are based largely on the acreage within 500 feet of surface waters that would experience surface disturbance or that would be protected from surface disturbance by the management actions being analyzed.
- The geographic information system (GIS) estimation of waterbody acres is based on the 1:24,000-scale 2009 USGS National Hydrography Dataset flowlines (with an approximation of 12-foot-wide perennial streams and 4-foot-wide intermittent streams) in combination with waterbody and major stream polygons.
- The GIS estimation of floodplain acres is based on the Federal Emergency Management Agency data. The BLM incorporated Federal Emergency Management Agency data (of very limited extent in the decision area) for classification of floodplains with very frequent flooding. Because it is based on known acres, the forecast is low. Data were incorporated as they were collected.

Indicator

- Acres acceptable for further consideration for coal leasing and future development in municipal watersheds

Alternative A

Alternative A would maintain the coal screen results used for the 2015 Proposed RMP/Final EIS analysis (BLM 2015a; *Minerals Appendix*, pages MIN-1 through MIN-137). No municipal watersheds were identified in the coal screen results. It is now known that there are approximately 9,540 acres of designated municipal watersheds in the three-county area where development is predicted to occur. Up to approximately 5,640 acres of these watersheds are forecasted to be disturbed.

Erosion and sedimentation would likely increase in disturbed areas due to vegetation removal; however, surface water quality would be protected by the implementation of best management practices required by the Montana Department of Environmental Quality. Any water produced by mining operations cannot be discharged to surface waters without a Montana Pollutant Discharge System permit, which provides some protection for water quality in the municipal watershed.

Alternative B

Under unsuitability criterion 17, the BLM identified 5,130 acres of municipal watersheds in the impact analysis area for Alternative B as unsuitable with exception. The RFD scenario forecasts that up to 5,640 acres of surface disturbance would be expected in the impact analysis area, which could include all 5,130 acres of municipal watersheds identified in the impact analysis area. These watersheds would be considered unsuitable for coal development. There is an exception that allows the BLM to consult with the municipality and determine that coal mining within the municipal watershed will not adversely affect the watershed to any significant degree. This would

assure any effects of coal development on municipal watersheds would not degrade water quality or quantity within the watershed.

Alternative C

Alternative C applies the same water resources multiple-use screen and unsuitability criteria as Alternative B. There are 4,180 acres of municipal watersheds unsuitable with exception within the Alternative C impacts analysis area. There are 950 acres of municipal watersheds with coal potential that are unsuitable without exception because of the expanded multiple-use screen.

Effects of coal development on municipal watersheds are the same as those described for Alternative B; however, because fewer acres are acceptable for further consideration for coal leasing due to the multiple-use screen, there could be less effect on municipal watersheds under Alternative C compared with Alternatives A and B. This would depend on the ultimate location of operations and development at the project level.

3.4.3 Cumulative Impacts

Cumulative impacts for Alternative A are described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Water Resources – Cumulative Impacts [Alternative E]*, page 4-69). For all water resources except municipal watersheds, cumulative impacts for Alternatives B and C would be the same as those under Alternative A. For municipal watersheds, there would be a slight reduction in cumulative impacts for Alternative B, since municipal watersheds in the impact analysis area are less than the forecasted 5,640 acres of surface disturbance possible under the RFD scenario. Similarly, Alternative C would have slightly less cumulative impacts than Alternative B with only 4,180 acres of municipal watersheds in the impact analysis area.

3.5 SPECIAL STATUS SPECIES

3.5.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Special Status Species – Affected Environment*, pages 3-52 through 3-67). A summary as it pertains to the decisions for this SEIS/RMPA is included below.

The BLM coordinates threatened and endangered species management with the USFWS and MFWP.

Federally listed species may have habitat considered crucial to species viability. For those listed species without critical habitat designation, the BLM cooperates with the USFWS to determine and manage important habitats.

Special Status Mammals

There were six special status mammal species considered in the 2015 Proposed RMP/Final EIS. These included five BLM sensitive species, one USFWS endangered species (black-footed ferret), and one USFWS threatened species (northern long-eared bat). Black-footed ferrets are not documented in the MCFO boundary, and suitable sites for reintroduction for experimental populations do not occur. Detailed descriptions can be found in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Special Status Species (Mammals) – Affected Environment,* pages 3-52 through 3-53).

Special Status Birds

A number of migratory bird species with habitat in the decision area are BLM sensitive species and are, therefore, managed as special status species according to BLM Manual 6840. These species include USFWS Birds of Conservation Concern, which have been identified as species that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA) and are in greatest need of conservation action. There are 34 avian special status species in the decision area. This includes 30 BLM sensitive avian species, two USFWS endangered avian species (interior least tern and whooping crane), and two USFWS threatened avian species (piping plover and red knot). Detailed descriptions can be found in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Special Status Species (Avian) – Affected Environment,* pages 3-53 through 3-66).

Greater Sage-grouse

Greater sage-grouse is a BLM sensitive species. In September 2015, the USFWS determined the greater sage-grouse no longer warranted protection under the ESA due to 98 separate federal land use plans that address conservation of the species.

The BLM formally began focusing on the conservation of greater sage-grouse with the issuance of the National Sage-grouse Conservation Strategy (BLM 2004). This effort was shorty followed by the state of Montana issuing the Management Plan and Conservation Strategies for Sage Grouse in Montana (Montana Sage Grouse Work Group 2005). In September 2015, Montana Executive Order 12-2015 was signed with the intent that the Montana Sage-Grouse Habitat Conservation Program is consistent with the efforts of the State of Wyoming implementation of the Greater Sage-Grouse Core Area Strategy. The Montana Greater Sage-Grouse Stewardship Act and Montana Executive Order 12-2015 together comprise the Montana Sage-Grouse Conservation Strategy. Since its commencement in 2016, the BLM has determined that this strategy is operational, effective, and consistent with all BLM goals and objectives for greater sage-grouse conservation.

Special Status Fish

Priority species with essential habitat are sicklefin chub, sturgeon chub, pallid sturgeon, and paddlefish. Pallid sturgeon is listed as endangered under the ESA. Essential habitat for sicklefin chub, pallid sturgeon, and paddlefish includes the Yellowstone and Missouri Rivers; essential habitat for sturgeon chub includes the Powder, Little Powder, Yellowstone, and Missouri Rivers. An important part of the essential fish habitat is the riparian areas bordering the rivers and not just the waterways themselves.

Threats to Special Status Wildlife and Fish

Primary threats to special status wildlife and fish include habitat loss, degradation, and fragmentation. Multiple factors can contribute to adverse impacts on wildlife and fish habitat, such as development, conversion to agricultural use, reduced water quality, water uses, recreation, roads and other linear infrastructure, herbivore and livestock grazing, introduction of invasive species, drought, wildfire, and climate change.

3.5.2 Direct and Indirect Impacts

Analysis Methods

This analysis focuses on the impacts of coal leasing and development on federally designated critical habitat for threatened and endangered species (unsuitability criterion 9), falcon nesting sites (unsuitability criterion 13), and migratory birds of high federal interest (unsuitability criterion 14). Bald and golden eagle sites (unsuitability criterion 11), while present in the MCFO, are not within the area of coal potential and are not expected to experience any impacts. There are no presently known bald or golden eagle roost or concentration areas (unsuitability criterion 12) in the MCFO. The BLM would consult best available science at the time of lease application for unsuitability screening.

Assumptions

- Effects on special status wildlife species are based primarily on potential effects on habitats that the BLM manages.
- Short- and long-term surface disturbance are assumed to occur in vegetation types, in proportion to the availability of these vegetation types, in the decision area. Affected acreages for vegetation types are not absolute, but provide a means for relative comparisons among alternatives.
- Precise quantitative estimates of effects generally are not possible because the exact locations of future actions are not known, population data for special status wildlife species are often lacking, or habitat types affected by activities cannot be predicted.
- Because of the migratory nature and relative mobility of some special status wildlife species, actions on non-BLM-administered land affect these species more than other species. In the case of migratory species, effects on winter and migration habitats could adversely affect the viability of some species. The BLM assumes winter and migration habitats to be at least as important to long-term viability of these species as breeding and nesting habitats.
- Actions that would adversely or beneficially affect one species would have similar effects on other species using the same habitats.
- Over the life of the SEIS, some species currently considered sensitive, or not formally included on the BLM sensitive species list, could be listed under the ESA. Some currently listed species could be delisted during the life of the plan. Most species delisted or downlisted from federally proposed or candidate status will be included on the BLM sensitive species list.
- The USFWS could designate additional wildlife species as threatened or endangered as additional data are collected and evaluated. These species would be managed in accordance with the ESA and as directed by BLM management decisions.
- All known special status raptor nests from the GIS database maintained by the BLM were used in the analysis. The BLM analyzed buffers associated with raptor nests in accordance with USFWS recommended spatial buffers to protect nesting raptors. The BLM analyzed nests of unknown raptor species as golden eagle nests when located in trees and as ferruginous hawk nests when located on the ground.

Indicators

- Acres acceptable for further consideration for coal leasing and future development in potential special status wildlife species habitat

Effects Common to All Alternatives

Effects of coal leasing and development on special status wildlife are discussed in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Fish, Aquatic and Wildlife Habitat, Including Special Status Species – Affected Environment,* pages 4-105 through 4-131).

The BLM would evaluate areas proposed for coal development for unsuitability when a lease application is received, and therefore provide for future protection, conservation, or mitigation of wildlife habitat considered as unsuitable with or without exception. As described in **Chapter 2**, the difference in alternatives is the amount of area acceptable for further consideration for coal leasing. Actual acres of disturbance cannot be geographically determined at the planning level.

The RFD scenario of tons of forecasted coal to be mined and the impact analysis area would not differ among alternatives. The unsuitability criteria for special status species protection would be applied across all alternatives. This would include unsuitability criteria 9 through 14 applied to individual lease applications in the forecasted 5,640-acre impact analysis area in Rosebud, Richland, and Big Horn Counties.

Criterion 9

Under Alternative A, 3,840 acres for the black-footed ferret were identified as acceptable for further consideration for coal leasing, but unsuitable with exceptions, under this criterion during the time of the 2015 Proposed RMP/Final EIS. Since the 2015 Proposed RMP/Final EIS, critical and essential habitat for federally listed species have been identified or modified (piping plover) or eliminated (back-footed ferret) and would require consideration for individual coal lease application for all alternatives in the future. Currently, there is no critical or essential habitat for black-footed ferrets in the MCFO boundary, but piping plover habitat has been designated around Fort Peck Lake, on the Missouri River, and in northeastern Montana alkali lakes and wetlands.

Alternative B has 47,860 acres and Alternative C has 320 acres of designated piping plover critical habitat acceptable for further consideration for coal leasing in the entire coal development potential area; however, critical habitat does not occur in the impact analysis area (within Rosebud, Richland, or Big Horn Counties) for all alternatives. Regardless of the amount of critical or essential listed species habitat acceptable for further consideration for coal leasing now or in the future, all these habitats would be determined unsuitable for surface mining, but with exceptions. A lease may be issued and mining operations approved if, after consultation at the leasing level for all alternatives, the USFWS determines that the proposed activity is not likely to jeopardize the continued existence of the listed species or its critical habitat.

Criterion 13

Under Alternative A, approximately 8,620 acres of federal lands with sensitivity because of existing falcon nesting sites were acceptable for further consideration for coal leasing, but unsuitable for surface mining with exceptions, for coal leasing at the time of the 2015 Proposed

RMP/Final EIS. Alternative B has 7,820 acres and Alternative C has 4,660 acres acceptable for further consideration for coal leasing in the coal development potential area and in the three counties where potential coal development is foreseeable.

All falcon nesting sites would be considered unsuitable for surface mining with exceptions under criterion 13 using the best available science at the time of lease application. Exceptions can occur if the BLM, after consultation with the USFWS, determines that coal mining will not adversely affect the falcon habitat during the periods when the falcons use such habitat. Therefore, no meaningful difference in falcon nesting site protection would occur at the planning level.

Criterion 14

Under Alternative A, no areas of high-priority habitat for migratory bird species of high federal interest were identified as unsuitable under criterion 14 at the time of the 2015 Proposed RMP/Final EIS. The Montana Natural Heritage Program, in conjunction with federal, state, and local agencies and other data providers, provides delineated habitats for migratory birds. Alternative A has no acres acceptable for further consideration for leasing. Alternative B has 47,860 acres available but with a maximum 5,640 acres in the impact analysis area; Alternative C has a maximum of 320 acres available. These areas are unsuitable for surface mining with exception.

The BLM may issue a lease as an exception where the BLM, after consultation with the USFWS, determines that coal mining will not adversely affect the migratory bird habitat during the periods when the species use such habitat. The impacts of coal leasing on migratory bird species would be the same across all three alternatives, because the unsuitability screen would prevent meaningful impacts on habitat under all alternatives.

Criterion 15

Criterion 15 considers federal mineral estate acceptable for further consideration for coal leasing that is habitat for resident species of fish, wildlife, and plants of high interest to the state and that is essential for maintaining these priority wildlife and plant species; but, it shall be considered unsuitable for surface mining with exceptions. This includes greater sage-grouse habitats.

Alternative A had 240,180 acres available at the time of the 2015 Proposed RMP/Final EIS. With current information, Alternative B has 317,510 acres, and Alternative C has 106,800 acres identified as acceptable but unsuitable with exceptions under criterion 15. However, since the coal RFD scenario does not differ among alternatives, 5,640 acres are forecasted for development under all alternatives. This represents the maximum potential disturbance to fish and wildlife resources.

Impacts on special status wildlife would not significantly differ among alternatives at the planning level. This is due to unsuitability criteria screens that exclude special status species habitat. Exceptions may occur at the individual lease application level, but further appropriate coordination with the appropriate federal and state wildlife regulatory agencies would occur. This would evaluate impacts and would result in appropriate protection at the project level.

Many of the species that fall under this criterion have reclamation as a stipulated method of coal mining; the BLM may add additional mitigation methods as better science becomes available. This stipulation requires reclamation using an approved seed mix that is appropriate to the soil type(s) found within the disturbance area. The approved seed mix sets guidelines for the amount of seed needed per acre, based on the percentage of pure live seed. Additionally, it sets the number of species of grasses, forbs, and shrubs required for the specific soil type(s). This stipulation would ensure vegetation communities are restored in a manner to provide quality native wildlife habitat. This would mitigate wildlife habitat loss.

Special Status Mammals

Impacts from potential coal development on special status mammals include habitat loss, habitat degradation, habitat fragmentation, and disturbance and displacement. The main threat to special status bats is loss and disturbance to hibernacula and roost sites. Coal development is not expected to affect important bat habitat (caves and mines) though some removal of foraging habitat may occur from future coal developments.

Under criterion 9, federally designated habitat and habitat determined to be of essential value to ESA species, including northern long-eared bat, would be considered unsuitable for coal development. Exceptions could occur, but any future coal development with the potential to affect ESA-listed or proposed species would require additional consultation with the USFWS at the project level.

Control options for black-tailed prairie dogs, as outlined in the Montana State Conservation Plan for Black-tailed and White-tailed Prairie Dogs, would provide the mechanism to consider control proposals on BLM-administered lands.

Special Status Birds

Impacts from the potential coal development on special status birds include habitat loss, reduced reproductive success through nest disturbance or loss, and injury or mortality from collision with vehicles or coal infrastructure. Most special status birds would be able to avoid impacts due to their mobile nature. BLM management actions focus on maintaining or increasing the viability and biological integrity of special status species' foraging and nesting habitats in the decision area. Migratory bird nesting habitat would be conserved by ensuring surface-disturbing activities are implemented in a manner that maintains local and regional migratory bird species' population as directed under management criteria for migratory birds in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Appendix GRSG Effects [GRSG Effects Analysis Process] and GRSG RDF [GRSG Required Design Features]*).

Impacts on raptors, including eagles, would be avoided or minimized through nest buffers. For example, a 0.5-mile buffer for bald and golden eagle nests would be deemed unsuitable for coal leasing. Exceptions may occur in coordination with the USFWS and MFWP at the individual lease application level.

Under criterion 9, federally designated habitat and habitat determined to be of essential value to ESA species would be considered unsuitable for coal development. For example, piping plover

critical habitat designated by the USFWS would have a 0.5-mile buffer from coal development,[6] which would protect this threatened bird and its habitat. Exceptions could occur, but any future coal development with the potential to affect ESA-listed or proposed species would require additional consultation with the USFWS at the project level. This would assure any impacts on ESA species would not jeopardize the species' existence.

Effects on greater sage-grouse could result from the loss or degradation of sagebrush habitats, especially in core habitats or priority habitat management areas and connectivity corridors, but also in general habitat management areas. Disturbance to important areas, such as leks, brooding sites, and wintering areas, as well as injury or mortality from coal development or exploration-related actions could reduce reproductive success and survivorship (BLM 2015a; *Greater Sage-Grouse – Affected Environment [Alternative E], pages* 4-130 through 4-131). Criterion 15 screens for wildlife of high interest to the state, including greater sage-grouse dancing and strutting grounds. For example, there would be buffers around greater sage-grouse leks and sharp-tailed grouse leks in accordance with the RMP.

No coal lease applications are reasonably foreseeable within priority habitat management areas (core population areas and core population connectivity corridors). Exceptions may occur; the BLM will review individual lease applications with consultation with MFWP and make specific stipulations regarding greater sage-grouse protection. The impacts would be minor for greater sage-grouse as exploration and development would be unlikely to occur within priority habitat management areas (core population areas and core population connectivity corridors), and buffers would prevent direct, and in some cases indirect, impacts in the remainder of sage-grouse habitat under all alternatives.

Special Status Fish

To protect special status fish and all their essential habitat, the BLM will exclude from further consideration for coal leasing a 1-mile corridor buffer on all streams. Exceptions could occur, but any future coal development with the potential to affect special status fish would require additional consultation with the USFWS or MFWP, or both, at the project level. All riparian areas, perennial streams, and wetlands would be unacceptable for further consideration for coal leasing, therefore ensuring protection from direct and some indirect impacts on aquatic wildlife, including fish. The BLM anticipates these avoidances to reduce impacts on special status fish to negligible levels for all alternatives.

3.5.3 Cumulative Impacts

Although there are differences in the availability of acres over the entire coal development potential area, impacts on special status species would not significantly differ between the alternatives due to the application of the same unsuitability criteria 9 through 15. Exceptions to unsuitability for special status species would require additional federal or state wildlife agency, or both, consultation, with appropriate stipulations and measures to protect special status species at the project level. Because the direct and indirect impacts under Alternatives B and C would be the same as those under Alternative A, the cumulative impacts would also be the same as those under Alternative A. Cumulative impacts are described in the 2015 Proposed RMP/Final

[6] Determined through coordination with the USFWS.

EIS (BLM 2015a; *Fish, Aquatic and Wildlife Habitat, Including Special Status Species – Cumulative Impacts,* pages 4-132 through 4-179).

3.6 FISH AND WILDLIFE

3.6.1 Affected Environment

Priority Habitats for Wildlife Management

BLM planning guidance provides direction for the designation of priority species and priority habitat for management. In addition to BLM special status species, this would also include those habitats occupied by a species recognized as significant for one factor, such as density, age, diversity, public interest, or remnant character. Priority habitats for management include those habitats containing:

- BLM special status species (see 2015 Proposed RMP/Final EIS section [BLM 2015a; *Special Status Species (Aquatics, Avian, and Terrestrial) – Affected Environment, pages 3-50 through 3-67*])
- Migratory birds (see 2015 Proposed RMP/Final EIS [BLM 2015a; *Special Status Species (Avian) – Affected Environment,* Table 3-18, page 3-54])
- Pronghorn antelope
- Mule deer
- White-tailed deer
- Rocky Mountain elk
- Sharp-tailed grouse
- Riparian areas, perennial streams, wetlands, and sport fish reservoirs

Mule deer (*Odocoileus hemionus*) are the most abundant big game species in the planning area and use the greatest diversity of habitats. While mule deer use all habitat types, they generally prefer sagebrush, grassland, hardwood draws, badland breaks, and conifer habitats.

White-tailed deer (*Odocoileus virginianus*) are common in the planning area and prefer riparian habitats and conifer areas, but they also will use a variety of other habitats. Suitable winter habitat is a key factor for white-tailed deer survival, and winter concentration areas occur almost exclusively in riparian and wetland habitats and dense pine.

Pronghorn antelope are the second-most abundant big game species in the planning area. Although generally associated with grasslands and shrublands, they also will use agricultural fields. Crucial pronghorn winter habitat is largely contained within areas identified as greater sage-grouse priority habitats and at a lower level within crucial mule deer winter range.

Rocky Mountain elk (*Cervus canadensis*) are associated with grasslands, shrublands, woodlands, and riparian areas and wetlands. Crucial elk winter habitat has not been identified within the decision area.

Upland game birds include sharp-tailed grouse (*Tympanuchus phasianellus*), greater sage-grouse (*Centrocercus urophasianus*), wild turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*), and gray partridge (*Perdix perdix*). The greater sage-grouse is considered a special status species and addressed in *Section 1.7, Special Status Species – Wildlife*, of the 2015 Proposed RMP/Final EIS. Sharp-tailed grouse is a BLM priority species for management because of public interest. Wild turkeys, ring-neck pheasants, gray partridges, and waterfowl are not a BLM priority species for management and will not be discussed further.

Sharp-tailed grouse are widely dispersed through the decision area. Identification of leks is ongoing, and many additional leks are suspected to occur on public land throughout the decision area. The primary threats to sharp-tailed grouse populations include habitat loss and degradation.

Fisheries and Aquatic Habitats

The aquatic resources include aquatic wildlife and habitat for fish, aquatic arthropods (insects and crustaceans), amphibians, reptiles, and bivalves. The habitat consists of rivers, streams, lakes, reservoirs, springs, and seeps that provide habitat for a variety of aquatic wildlife and riparian communities.

3.6.2 Direct and Indirect Impacts

Analysis Methods

Assumptions

- The BLM, in cooperation with state and other federal wildlife agencies, is responsible for managing habitat (for example, quality, suitability, and usability); state and federal wildlife management agencies (for example, Montana Fish, Wildlife and Parks (MFWP) and the US Fish and Wildlife Service [USFWS]) have primary authority for overseeing management of wildlife populations. This analysis, therefore, relies primarily on vegetation changes and loss of habitat use due to disruptive activities to forecast effects on wildlife habitats.
- High-quality habitats foster healthy and abundant biological communities appropriate to those habitats.
- The quality and quantity of seasonal ranges and migration corridors are generally considered to be the limiting factors on big game populations in the decision area. The ability of these areas to support wildlife populations is a factor in determining population levels.
- Natural variability in wildlife health, population levels, and habitat conditions will continue. Periods of mild or severe weather and outbreaks of wildlife disease or insects and plant diseases that affect habitat could affect wildlife population levels.
- For each alternative, changes to vegetation types, either in quantity, quality, or increased fragmentation, are compared with baseline conditions. Adverse and beneficial impacts on vegetation types (for example, wildlife habitats) are assumed to have a corresponding adverse or beneficial impact on wildlife species.

- Disturbance impacts on wildlife are evaluated by comparing them with current management practices in the decision area. Increased protections in time or space are beneficial; reduced protections result in adverse impacts.
- Management actions aimed at benefiting specific wildlife species can have adverse or beneficial impacts on other wildlife species.
- Alternatives with more acres of wetlands restored or protected will provide a greater benefit to migratory game birds and other riparian and wetland wildlife species compared with alternatives with fewer acres of wetlands restored or protected.
- Surface disturbance causes adverse impacts on wildlife habitats. Less surface disturbance in wildlife habitats has correspondingly fewer adverse impacts on wildlife compared with more surface disturbance.
- Human activity that disturbs wildlife during sensitive periods causes adverse impacts.
- "Prohibit" means that specified activities or impacts on wildlife during identified periods or in designated habitat areas would not occur unless specific biological exception criteria are met.
- Prohibiting surface disturbance or occupancy is more restrictive and provides more protections for wildlife than avoiding surface disturbance or occupancy.
- All known raptor nests from the GIS database maintained by the BLM MCFO were used in the analysis. Buffers associated with raptor nests were analyzed in accordance with USFWS recommended spatial buffers to protect nesting raptors. The BLM analyzed nests of unknown raptor species as golden eagle nests when located in trees and as ferruginous hawk nests when located on the ground.
- The BLM utilizes best available information, peer-reviewed science, management and conservation plans, research, and BLM directives, as appropriate, to guide fish, aquatic, and wildlife habitat management.
- Delineations of important wildlife habitats (for example, grouse leks, crucial winter ranges, and raptor nests) would be modified based on habitat monitoring, wildlife population surveys, and other information provided by industry, the BLM, and MFWP.

Indicators

- Acres acceptable for further consideration for coal leasing and future development for vegetation communities in the decision area
- Acres acceptable for further consideration for coal leasing and future development in mapped wildlife habitat, seasonal ranges, migration corridors, and nest buffers

Effects Common to All Alternatives

As described in **Section 2.2**, Alternatives Development, the difference in alternatives is the amount of area acceptable for further consideration for coal leasing. Coal development on BLM-administered lands would include the same unsuitability criteria for resource protection across all alternatives. Criterion 15 considers federal lands that are habitat for resident species of fish,

wildlife, and plants of high interest to the state and that are essential for maintaining these priority wildlife and plant species. These include active dancing and strutting grounds for grouse; winter ranges crucial for deer, antelope, and elk; and extremes of range for plant species.

Under all alternatives, the number of acres acceptable for further consideration for coal leasing far exceeds the number of acres (5,640 acres) forecasted for development. This foreseeable disturbance forecast represents the maximum anticipated potential disturbance to fish and wildlife resources, even though the area acceptable for further consideration for leasing is much larger. The BLM may issue a lease if, after consultation with the state, it determines that all or certain stipulated methods of coal mining will not have a significant long-term impact on the species being protected.

Priority Habitats for Wildlife Management

Coal development would affect wildlife through habitat loss or degradation, disturbance, or displacement (especially during sensitive breeding or wintering periods); habitat fragmentation; and injury or mortality from infrastructure activities (such as vehicle collisions). Applying criterion 15 for all alternatives would reduce or avoid impacts on minor levels and ensure that essential habitat is protected for resident species of fish, wildlife, and plants of high interest to the state. A 2-mile buffer around sharp-tailed grouse leks is part of the unsuitability screening process.

Fisheries and Aquatic Habitats

Effects from coal exploration and development could affect fisheries and aquatic habitats through degradation of water quality. Erosion and runoff from surface disturbance from coal development could increase sedimentation in waterways, degrade aquatic and riparian vegetation, and contaminate water resources with hazardous materials. These impacts could reduce survivorship of fisheries and wildlife that depend on riparian and aquatic habitats. Understanding the importance of riparian and aquatic habitats and the difficulty of restoring these areas after disturbance, the BLM realizes the most effective conservation method is avoidance.

Perennial waterways and adjacent riparian areas, which are important habitat for numerous wildlife species and fisheries, would have a 300-foot buffer from coal development to help protect habitat for species of high interest to the state. Riparian and wetland aquatic habitat would have a 10-foot buffer in multiple-use conflict areas to protect high recreational values and wildlife species of high interest to the state. Sport fish reservoirs would have a 0.25-mile buffer in multiple-use conflict areas for recreational purposes. The public uses and values sport fish reservoirs for fishing, hunting (waterfowl, big game, and small game), camping, sightseeing, and other activities. The 0.25-mile buffer would protect the surrounding banks and riparian vegetation to protect fish habitat and maintain wildlife recreational uses. These protection measures under all alternatives would avoid and minimize impacts on fisheries and aquatic-associated wildlife to negligible levels.

3.6.3 Cumulative Impacts

Although there are differences in the availability of acres over the entire coal development potential area, impacts on fish and wildlife resources would not substantially differ between the alternatives due to application of the same unsuitability criterion 15 screening. Exceptions to

unsuitability for fish and wildlife resources would require additional state wildlife agency consultation, with appropriate stipulations and measures, to protect fish and wildlife resources at the project level. Because the direct and indirect impacts under Alternatives B and C would be the same as those under Alternative A, the cumulative impacts would also be the same as those under Alternative A. Cumulative impacts are described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Fish, Aquatic and Wildlife Habitat, Including Special Status Species – Cumulative Impacts,* pages 4-132 through 4-179).

3.7 CULTURAL RESOURCES

3.7.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Cultural Resources – Affected Environment,* pages 3-72 through 3-82). In addition, the BLM has prepared an updated compilation of current 2018 cultural resource inventory data, USGS coal potential data, and data related to coal screening (BLM 2019). There are 2,635 recorded cultural resource sites within the coal development potential areas in Richland, Rosebud, and Big Horn Counties. Locations important to Native American cultural and religious uses are present in areas with coal potential as well as locations having cultural viewsheds. Finally, there are three National Historic Landmarks within the coal development potential areas in Richland, Rosebud, and Big Horn Counties. The BLM has forecasted that there are 5,640 acres in the three counties forecasted to have surface disturbance that fall under criterion 7, Historic Lands and Sites. Known resource density within the coal potential polygon is 1 site per 500 acres.

3.7.2 Direct and Indirect Impacts

Analysis Methods

The analysis focuses on data available for the cultural resources' unsuitability criterion 7, which is assumed to accurately represent the types of resources in the decision area in the future. Under Alternatives B and C, 99,050 acres would be unacceptable for further consideration for coal leasing because of cultural resource viewshed concerns. These areas are removed from further consideration for coal leasing under the multiple-use coal screen (Screen 3; **Appendix A**, **Section A.3.3**). Because these areas would be unacceptable for further consideration for coal leasing, there would be no impacts on the cultural resource viewshed; therefore, they are not discussed further. Impacts under Alternative A are disclosed in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Cultural Resources – Environmental Consequences [Alternative E],* page 4-202).

Analytical Assumptions

- The degree of adverse impacts on cultural resource sites and the total number of sites adversely affected are directly correlated with the amount of surface disturbance or other disruptive activities allowed under each alternative. Reduction or elimination of land uses in a particular area would benefit cultural resources through a reduction in direct and indirect impacts on the resources.

- All surface-disturbing activities would require cultural resource inventories/surveys of affected sites before the initiation of surface-disturbing activities.[7] Based on recorded sites, site density in Richland County is 8 sites per 10,000 acres; it is 3 sites per 1,000 acres for Rosebud and Big Horn Counties.
- All surface-disturbing activities would avoid or mitigate impacts on historic properties. For analysis purposes, it is assumed that 10 to 15 percent of sites are, or have the potential to be, eligible for listing on the National Register of Historic Places (NRHP).
- Surface-disturbing activities could affect some cultural resources, especially buried cultural resources, because they are difficult to locate through surface inventory/surveys.
- Historic settings of cultural resources are sometimes important cultural resources that are included in the consideration of potential impacts on cultural resources.
- NRHP criteria are used to evaluate significance, and NRHP eligibility will guide the management of cultural resources. Avoidance is the preferred mitigation choice for both eligible and ineligible cultural resources. Where cultural resources are not eligible for listing on the NRHP and where impacts on them are unavoidable, depending on the nature and value of the resource, data recovery, extensive recordation, or interpretive and education mitigation may be used.
- The BLM would consult with appropriate tribes, according to guidance set forth in BLM Manual and Handbook 1780, and relevant authorities listed therein. The BLM would do this to identify and address potential resource concerns likely to affect the access or availability of resources or locations important to traditional lifeways, including subsistence, economic, ritual, and religious resources and locations.

Indicators

- Number of National Historic Landmarks acceptable for further consideration for coal leasing and future development

Effects Common to All Alternatives

Effects of coal leasing and development on cultural resources are discussed in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Cultural Resources – Environmental Consequences,* pages 4-193 through 4-199). Land allocations do not grant any rights or authorize any activities directly affecting cultural resources. The impact analysis focuses on the potential future actions and disturbance forecasts. In all cases, before any ground disturbance or other future actions, further decision-making would be required, including cultural resource compliance.

[7] This generally requires a Class III intensive field inventory of the affected area. This allows for prescriptive mitigation of impacts through avoidance or other measures where necessary, and minimizes or eliminates the potential for unmitigated impacts on cultural resources. In areas with a high potential for buried resources, construction monitoring and open trench inspection are some of the methods used to discover and protect cultural resources not apparent from surface inventories.

Direct and indirect impacts on cultural resources include activities that would involve surface-disturbing activities, including damaging, destroying, or displacing artifacts and features. Indirect impacts on cultural resources would include changing the character of a property's use or physical features in its setting that contributes to its historic significance (such as isolating the property from its setting) and introducing visual, atmospheric, or audible elements that diminish the integrity of its historic features.

Before the BLM authorizes any undertakings, actions would be subject to cultural resources review and compliance with the Section 106 process of the National Historic Preservation Act through existing state and national BLM protocols and agreements with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation. Areas proposed for coal development would be evaluated for unsuitability when a lease application is received. The difference in alternatives is the amount of area acceptable for further consideration for coal leasing. Actual locations and acres of disturbance cannot be geographically determined at the resource management planning level.

Alternative A

Alternative A would maintain the coal screen results used for the 2015 Proposed RMP/Final EIS (BLM 2015a; *Minerals Appendix*, page MIN-197). The BLM concluded that there were no lands within the coal areas that were listed on the National Register of Historic Places under screening criterion 7, Historic Lands and Sites. However, the BLM identified 2,520 federal coal acres overlain by sites considered eligible for listing on the NRHP, but not formally nominated. These coal lands were declared unsuitable under this criterion. A maximum of approximately 5,640 acres is forecasted to be disturbed under Alternative A. Potential direct and indirect impacts would be the same as those described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Cultural Resources – Affected Environment* and *Environmental Consequences*, pages 3-72 through 3-82, pages 4-193 through 4-199, and page 4-202).

Alternative B

Under Alternative B, three National Historic Landmarks (Lee Homestead, Bone Brother Ranch, and Deer Medicine Rocks) are within the area acceptable for further consideration for coal leasing. Criterion 7 includes an exception for coal leasing and development. It would require consultation with the Advisory Council on Historic Preservation and the SHPO to mitigate impacts on National Historic Landmarks. The impacts would be a reduction from Alternative A because of the increase in acres unacceptable for further consideration for coal leasing under the multiple-use screen and areas identified as unsuitable without exceptions. There would be a reduction in the potential for impacts from coal when compared with Alternative A.

Alternative C

Under Alternative C, one National Historic Landmark (Lee Homestead) is within the area acceptable for further consideration for coal leasing. Criterion 7 includes an exception for coal leasing and development. It would require consultation with the Advisory Council on Historic Preservation and the SHPO to mitigate impacts on National Historic Landmarks. The impacts would be a reduction from Alternative A because of the increase in acres unacceptable for further consideration for coal leasing under the multiple-use screen and areas identified as

unsuitable without exceptions. There would be a reduction in the potential for impacts from coal when compared with Alternative A.

3.7.3 Cumulative Impacts

Past, present, and reasonably foreseeable future actions have the potential to have significant impacts on known and undetermined historic properties in the planning area. Cumulative impacts for Alternative A are described the Proposed RMP/Final EIS (BLM 2015a; *Cultural Resources – Cumulative Impacts [Alternative E]*, pages 4-202 through 4-204). Cumulative impacts for Alternatives B and C would be far less than those under Alternative A.

3.8 LANDS AND REALTY

3.8.1 Affected Environment

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (2015a; *Lands and Realty – Environmental Consequences*, pages 3-116 through 3-123). Existing infrastructure within the coal leasing action area primarily consists of local, state, and interstate roadways and other linear and nonlinear rights-of-way (ROWs).

3.8.2 Direct and Indirect Impacts

Impacts in this section focus on existing ROWs and easements (unsuitability criterion 2) and buffer zones along road ROWs (unsuitability criterion 3). Conservation easements would be acceptable for further consideration for leasing under Alternatives B and C; they would not be affected further. Other types of ROWs and land tenure actions would not be different from those described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Lands and Realty – Environmental Consequences*, pages 4-304 through 3-335).

Analysis Methods

Assumptions

- Areas leased for coal are unlikely to be available for other ROW development.
- Under all alternatives, cities, cemeteries, and Interstate 90 would be unsuitable for surface coal mining with no exceptions (unsuitability criterion 3).

Impact Indicators

- Acres suitable and unsuitable for coal development
- Acres foreseeably developed for coal mining

Effects Common to All Alternatives

Direct and indirect impacts on lands and realty would be as described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Lands and Realty – Environmental Consequences*, pages 4-202 through 4-204). Under all alternatives, 43 CFR 3461 coal screening criteria would result in certain ROWs, such as public roads, other lands within ROWs or easements, and lands within proximity to cemeteries and residential dwellings, to be unsuitable for coal development with exceptions.

There are ROWs present within the 5,640 acres of forecasted disturbance. Where those ROWs occur, they would be unsuitable unless one of the exceptions could be met. At the leasing stage, the BLM would review screening criteria based on the site-specific location of the lease, make a final unsuitability determination, and complete the appropriate impact analysis. If authorized, consultation with appropriate parties would determine the extent to which the authorized use would be relocated as a result of coal development in those areas. If relocated, the result would be a similar infrastructure footprint, but in a different location.

3.8.3 Cumulative Impacts

Cumulative impacts on lands and realty would be as described in the 2015 Proposed RMP/Final EIS. Combined with past, present, and reasonably foreseeable future actions identified in the 2015 Proposed RMP/Final EIS, there could be the potential for an increasing number of ROWs in the MCFO planning area. However, screening criteria 2 and 3 would limit the potential for impacts on lands and realty under all alternatives.

3.9 ECONOMIC CONSIDERATIONS

Economic considerations are disclosed in this SEIS/RMPA as a result of the BLM updating the RFD scenario in response to the need to update the coal screening analysis. Based on information gathered from existing mining operations in the MCFO and associated mine permits received, the BLM updated the RFD scenario from what was considered in the 2015 Proposed RMP/Final EIS. Because of this, there is an updated economic forecast from what was disclosed in the 2015 Proposed RMP/Final EIS.

This section incorporates by reference the affected environment described in the 2015 Proposed RMP/Final EIS (BLM 2015a; *Social and Economic Conditions – Affected Environment*, pages 3-129 through 3-145). A summary as it pertains to the decisions for this SEIS/RMPA is included below. This section discloses the economic impacts of the actions considered in this EIS. A discussion of social impacts from climate change is disclosed in **Section 3.4**, Air Resources, Including Greenhouse Gasses and Climate Change.

3.9.1 Affected Environment

The socioeconomic analysis area is defined as Big Horn, Rosebud, and Richland Counties within the jurisdiction of the BLM MCFO. In addition, Yellowstone County is included in this analysis per Montana intercounty commuting patterns for regional coal employment. Production analyzed in the socioeconomic analysis area is for surface coal.

The 2015 Proposed RMP/Final EIS (BLM 2015a; *Social and Economic Conditions – Affected Environment*, page 3-129 through 3-145) addresses the baseline demographic and economic information related to trends, populations, and economic sectors that can be affected by BLM-managed actions for the socioeconomic analysis area. Baseline demographic and economic information for Yellowstone County is available in the Billings Field Office Final EIS (BLM 2015b).

Coal Production

The US holds the largest single-region coal reserves in the world, accounting for approximately 30 percent of global reserves. National production has maintained at around 1,000 MMst per year from 1990 until 2015 (Hook and Aleklett 2009; CRS 2017; BGR 2017). US coal reserves are concentrated to three regions: the Appalachian coal region, Interior coal region, and the

Western coal region, with each region containing coal producing basins (EIA 2018A). In 2017, US coal production was approximately 774 MMst (MSHA 2018). US coal reserves and changes in domestic coal production trends are described in further detail in **Appendix E,** Supplemental Coal Market Report.

Montana is part of the Western coal region, the largest coal producing region in the US, which accounted for approximately 56 percent of total US coal production in 2017 (EIA 2018a). The Powder River Basin (PRB), within the Western coal region, is the largest coal producing basin in the US, accounting for approximately 71.4 percent of total coal production in the Western coal region and 43.2 percent of total coal production in the US (MSHA 2018; EIA 2018a). Given the proportion of production occurring in the PRB, the EIA and MSHA report coal production and employment data for the PRB and the remainder of the Western coal region separately (MSHA 2018). While Montana coal production primarily occurs within the PRB, coal production also occurs in areas defined by the EIA and MSHA as separate from the PRB, but within the Western coal region (MSHA 2018).

In 2017, the Western coal region produced a total of 403 MMst. Within the Western coal region, the PRB produced 334 MMst of surface coal, accounting for 43.2 percent of total US coal, out of 16 mines; the remainder of the Western coal region produced 68 MMst of surface and underground coal, accounting for 8.8 percent of total US coal, out of 20 mines (MSHA 2018).

In 2017, Montana was the sixth-highest coal producer in the United States, with approximately 35 MMst mined within the state (EIA 2018b; MSHA 2018). Historically, the Montana coal industry has been an important economic driver for the state, accounting for a total employment contribution of 6,588 jobs and generating approximately $774 million in total contributions to state gross domestic product in 2015 (National Mining Association 2016). Coal production in Montana also contributes to the Montana Coal Severance Tax Trust Fund, which supports a variety of public infrastructure projects throughout the state (Montana Department of Commerce 2017; Montana Legislative Fiscal Division 2015). Information on the trust fund and other sources of statewide mineral revenues are described in further detail in the *Mineral Revenue* section.

In 2017, approximately 29 MMst was produced within the socioeconomic analysis area of Big Horn, Rosebud, and Richland Counties. Approximately 69.7 percent of production in the socioeconomic analysis area occurred in Big Horn County (MSHA 2018). Of the total coal production in the socioeconomic analysis area, 58 percent came from coal mined on federal mineral estate (see **Appendix C** for more information on coal production in the decision area). **Table 3-9**, below, describes coal production in each county, the PRB, the remainder of the Western coal region (WCR) not including the PRB, and the state of Montana.

In 2017, the Spring Creek Mine Complex produced the most coal in the planning area, accounting for approximately 12.7 MMst, or 43.3 percent of the socioeconomic analysis area total (MSHA 2018). **Table 3-10**, below, presents 2017 coal production by mine.

Table 3-9
Socioeconomic Analysis Area Coal Production, 2017

Production Category	Big Horn County	Rosebud County	Richland County	PRB*	WCR*	Montana
Number of Mines	3	1	1	16	20	6
2017 Coal Production (MMst)	20.5	8.6	0.3	334.4	68.4	35.2

Source: MSHA 2018
*The PRB and WCR include mines that are not within the state of Montana. Four mines within the PRB are also within Montana. One mine within the remainder of the WCR is within Montana.

Table 3-10
Socioeconomic Analysis Area Production by Mine, 2017

Mine Name	County	2017 Coal Production (MMst)
Decker Mine	Big Horn	4.2
Absaloka Mine	Big Horn	3.6
Spring Creek Mine Complex	Big Horn	12.7
Savage Mine	Richland	0.3
Rosebud Mine & Crusher/Conveyer	Rosebud	8.6
Planning Area Total	**-**	**29.3**

Source: MSHA 2018

Recoverable reserves present the forecasted amount of coal that can be potentially recovered. In 2017, Montana had approximately 779 short tons of recoverable reserves, accounting for 4.8 percent of total US reserves, as reported by mines producing more than 25,000 short tons to the EIA (EIA 2018b). Given the percentage of coal production that occurs on federal mineral estate (58 percent) within the socioeconomic decision area, it is reasonable to believe that the majority of these recoverable reserves also exist in this area.

Capacity utilization rates represent the ratio of annual coal produced to annual productive capacity and help identify the operating rate of a coal mine. They identify the proportion of output realized given the constraints to mine inputs. In 2017, Montana's capacity utilization rate for surface coal production was 70.2 percent, which is higher than the US rate of 69.9 percent (EIA 2018b).

The BLM obtained the price of coal from the EIA minemouth price database. Coal prices were derived from the quality of the coal produced and the ease of the mineral's extraction. Since PRB coal has a lower heating value and can be mined from the surface relatively inexpensively, it commands a lower price than coal from other coal producing regions. In 2018, the average annual price for PRB coal was $13.22 per short ton (EIA 2019a). **Table 3-11**, below, shows the 2018 average coal prices by region.

Table 3-11
2018 Minemouth Prices by Region

Basin	Price per Short Ton (2018$)
Arizona/New Mexico	38.39
Northern Appalachia	53.21
Central Appalachia	79.10
Southern Appalachia	128.61
Eastern Interior	42.48
Rocky Mountain	39.03
Gulf	16.80
Powder River Basin	**13.22**

Source: EIA 2019a

Compared with other coal producing basins that provided low-sulfur, sub-bituminous coal in 2018, western Montana coal from the PRB had the second-lowest price in the United States; only Wyoming PRB coal held lower prices. The average price of Montana PRB coal, at $16.14 per short ton, was higher than the PRB average of $13.22 per short ton, while Wyoming PRB coal, at $13.10 per short ton, was lower than the PRB average (EIA 2019b). The average price of low-sulfur, sub-bituminous coal is available in **Table 3-12**, below.

Table 3-12
Low-Sulfur, Sub-Bituminous Price per Basin 2018

Basin	Price per Short Ton (2018$)
Washington/Alaska	39.05
Rocky Mountain	77.24
Wyoming PRB	13.10
Western Montana PRB	**16.14**

Source: EIA 2019b

Coal Employment

Employment levels varied across mines and counties in the socioeconomic analysis area. In 2017, a total of 894 were employed in the socioeconomic analysis area (MSHA 2018). The Rosebud Mine Crusher and Conveyer, located in Rosebud County, represented the majority of coal employment, accounting for 36.6 percent of coal employment in the socioeconomic analysis area (MSHA 2018). At the county level, Big Horn County held 553 coal jobs, Rosebud held 327 coal jobs, and Richland County held 14 coal jobs (MSHA 2018). See **Table 3-13**, below, for more information on employment distribution.

Table 3-13
Socioeconomic Analysis Area Employment by Mine, 2017

Mine Name	County	Average Annual Employment
Decker Mine	Big Horn	153
Absaloka Mine	Big Horn	139
Spring Creek Mine Complex	Big Horn	261
Savage Mine	Richland	14
Rosebud Mine & Crusher/Conveyer	Rosebud	327
Planning Area Total	**-**	**894**

Source: MSHA 2018

Coal employment data identify the relative intensity of the coal industry to total employment. In 2017, Big Horn County had the highest percentage of coal employment relative to total employment at 9.4 percent, while Richland County had the lowest at 0.2 percent of total employment in the coal industry (MSHA 2018; BEA 2019). For comparison, Montana had 0.17 percent of total employment in the coal industry, while the United States had 0.027 percent of the employed labor force in the coal industry (EIA 2018b; BEA 2019). While coal employment may not provide major employment contributions to state or national totals, they do provide a larger contribution to the counties within the socioeconomic area of analysis. See **Table 3-14**, below, for more detailed information on coal employment numbers.

Table 3-14
Socioeconomic Analysis Area Coal Employment Ratio, 2017

County	Coal Employment	Total Employment	Percentage Coal Employment
Big Horn	553	5,859	9.4
Richland	14	8,397	0.2
Rosebud	327	5,580	5.9

Source: MSHA 2018; BEA 2019; EIA 2018b

Location quotients identify the concentration of a particular industry in a specified region compared with a larger reference region. They determine which industries make a region unique, while also identifying regional export characteristics. Values of location quotients are calculated by comparing an industry's share of regional employment against the same industry's share of national employment and can be interpreted as the number of times more concentrated an industry is in a specified region compared with a larger reference region (Sentz 2011). In 2017, the coal industry in Big Horn County was almost 56 times more concentrated than the state of Montana, and over 349 times more concentrated than the United States. See **Table 3-15**, below, for more information.

Table 3-15
Socioeconomic Analysis Area Coal Location Quotient, 2017

County	Location Quotient to MT	Location Quotient to US
Big Horn	55.5	349.6
Richland	0.94	5.9
Rosebud	34.5	217.1
Montana	X	6.3

Source: MSHA 2018; BEA 2019; EIA 2018b

Mineral Revenue

Coal mining activities within the socioeconomic analysis area contribute to federal, state, and county fiscal revenues. This SEIS/RMPA discusses the current conditions of mineral revenues related to coal production within the decision area.

Coal production provides an important revenue source for Montana, accounting for $85.5 million, approximately 4.2 percent, of statewide revenue generation in 2018 through coal severance taxes and coal gross proceeds taxes (ONRR 2019a; Montana Department of Revenue 2018). These funds support state and local social services such as education, road maintenance, public services, cities, towns, special districts, and more.

County Coal Gross Proceeds Taxes

Counties in Montana impose a 5 percent flat coal gross proceeds on the taxable value of production, where gross proceeds are defined as the "number of tons multiplied by the contract sales price" (Montana Department of Revenue 2019; ONRR 2019a). Gross proceeds are applied before any costs or expenses are deducted from the total collected contract sale. Counties rely on gross proceeds taxes to support public and social support services. Changes in collected tax revenue may have disproportionate effects on local economies given the importance to the overall budget.

In 2017, coal production in Montana generated approximately $20,018,132 for Big Horn, Rosebud, and Richland Counties (MCC 2019).

Using US Mine Safety and Health Agency data, approximately $11,623,744 was generated for Big Horn County, $4,903,420 for Rosebud County, and $147,882 for Richland County.

State Mineral Revenues

The state of Montana imposes two forms of taxes on coal production: the resource indemnity and groundwater assessment tax and a coal severance tax. The resource indemnity and groundwater assessment tax is applied as 0.4 percent of the taxable value of production (ONRR 2019a). In 2017, statewide coal production contributed $1.8 million to Montana revenues (MCC 2019).

Coal severance taxes vary by quality and mining method; however, surface coal within the socioeconomic analysis area is taxed as 15 percent on the taxable value of production (ONRR 2019a). Article XI, Section 5 of the Montana state constitution requires that 50 percent of collected coal severance taxes be allocated to the Coal Severance Tax Trust Fund, which

supports renewable energy development projects, regional water systems, economic development opportunities, and state operated educational facilities (Montana Department of Commerce 2017; Montana Legislative Fiscal Division 2015). Collected end of year coal severance taxes from 2013 to 2018 are available in **Table 3-16**, below.

According to the Montana Coal Council, approximately $1.017 billion currently sits in the Montana Coal Trust Fund (MCC 2019).

Table 3-16
Montana Coal Severance Taxes

Fiscal Year	Fiscal Year-End (Millions)
2013	$54.5
2014	$56.8
2015	$61.8
2016	$54.5
2017	$55.4
2018	$58.3

Source: Montana Department of Revenue 2018

State Property Taxes
Montana imposes production property rents on coal mines located on state land. Rental rates on state land are prescribed at $3 per acre (ONRR 2019a).

Federal Revenues
Surface coal production on federal land in Montana is subject to a federal royalty rate, a rental rate, and abandoned mine land (AML) fees. Domestic coal producers are also required to pay a coal excise tax on production volume.

The revenue collected from the coal excise tax by the Internal Revenue Service (IRS) goes directly into the Black Lung Disability Trust Fund (BLDTF) to support medical services for miners with black lung disease (ONRR 2019c). Coal excise taxes were restructured at the beginning of calendar year 2019 to $0.25 per short ton of produced coal (minus the tonnage of moisture content) but may not exceed 2 percent of the market value of production (ONRR 2019c).

Federal royalty rates for surface coal production are prescribed as 12.5 percent of the taxable production value; however, under certain conditions, coal mines can negotiate lower effective royalty rates. As such, Montana reports an average federal royalty rate of 11.61 percent. The Office of Natural Resource Revenue returns 49 percent of revenues collected back to the states in which they were generated.

Federal coal leases are subject to annual rent payments equal to $3 per acre. AML fees are identified as $0.28 per short ton for surface mined coal (ONRR 2019a).

For the 2017 calendar year, the Office of Natural Resource Revenue collected approximately $32,577,732 in federal revenue from coal production in Big Horn and Rosebud Counties.

Approximately $32 million, or 99.7 percent of total federal revenue collected in the socioeconomic analysis area, came from federal royalties, while $101,015, or less than 1 percent, came from rental fees (ONRR 2019b). Big Horn County generated approximately $22,388,254 in federal revenue, Rosebud County generated $10,188,158, and Richland County generated $1,320 (MSHA 2018; ONRR 2019b).

3.9.2 Direct and Indirect Impacts

Coal production is driven by the market demand for coal in the US electric generation fuel energy mix. The nationwide demand for coal in the US electric generation fuel energy mix is expected to decrease between 2018, where coal accounts for 28 percent of the energy generation mix, and 2050, where coal accounts for 17 percent of the energy generation mix. This is driven primarily by the large reserves and production of US natural gas, continuously low natural gas prices, and the shift toward natural gas as the fuel of choice for energy production.

The combination of a large supply and lower prices is expected to increase the percentage of US electricity generation fueled by natural gas-fired power plants, leading to the decreased competitiveness of coal-fired electricity generation and eventual retirements of less efficient coal plants (AEO 2019). Forecasted market demand for coal is described in further detail in **Appendix D**, Coal Market Supplementary Report.

While domestic market demand is expected to decrease over the planning horizon, production in the planning area is expected to increase. This is due to global market demand. The Decker and Spring Creek Mine Complex, which account for approximately 57.5 percent of total coal production in the decision area regardless of mineral ownership, export on average 80 percent of produced coal to international markets. Direct and indirect impacts associated with decreased coal production in the socioeconomic analysis area are described in detail in this section.

Analysis Methods

Assumptions

- The RFD would not change across alternatives although there are differences in the number of acres acceptable for further consideration for leasing. The current level of leases would support the rates of production.
- Federal, state, and local taxes will continue to be collected on coal produced in the socioeconomic analysis area.
- International, national, and regional market conditions will continue to affect the pace and timing of coal development in the decision area; these issues are outside the BLM's control.
- The 2017 coal production output per worker will hold constant over the 20-year planning horizon.
- There will be no disruptive changes to existing coal development technology.
- Future coal production being analyzed encompasses low-sulfur, sub-bituminous coal comparable with what is currently produced in decision-area mines.

Indicators

- Employment supported by coal production
- Labor income supported by coal production
- Value added supported by coal production
- Tax revenue collected by federal, state, and county governments supported by coal production

Methodology

To calculate the economic contribution of forecasted federal coal production in the socioeconomic analysis area, an input-output model, Impact Analysis for Planning Model (IMPLAN), was used to estimate the economic activity supported by forecasted production levels. The IMPLAN model estimates the effects of changes in employment on economic indicators that follow from direct, indirect, and induced impacts.

For this analysis, direct effects can be described as the direct jobs and incomes associated with coal production. Indirect effects are the economic changes associated with backward-linked industries, such as the purchases made by suppliers to coal production in the planning area. Induced effects are the economic changes resulting from household spending from changes in household income. Taken together, these combined economic effects describe the contribution of employment shocks from changes in the level of coal production over the 20-year planning horizon. Effects are described in terms of output, income, and jobs.

The IMPLAN model was used to gather response coefficients, which are ratios that measure how employment, labor income, and output respond to a one job change in the coal sector. Baseline employment conditions were gathered from the US Mine Safety and Health Administration; forecasted federal coal production is available in **Appendix C**. The BLM estimated direct employment levels over the planning horizon by assuming the 2018 production output per worker would remain constant over the 20-year planning horizon. Monetary transfers in the form of taxes or fees were excluded from the IMPLAN analysis; however, these transfer payments are discussed in the *Mineral Revenue* section.

Direct, Indirect, and Induced Effects

Input-output models (i.e., IMPLAN) are static models that measures output in an economy at a point in time. The model is used to describe an economy at a single point in time, introduce a change to the economy, and evaluate the economy after it has responded to the change. Static models do not describe how an economy moves from one equilibrium to the next, and they assume there are no changes in wage rates, input prices, economic linkages, and property values.

IMPLAN can provide estimates on how economic indicators respond to a one job change in a specific sector of the economy through their response coefficients. By applying response coefficients to direct employment, the level of economic activity supported by forecasted coal production can be estimated.

The baseline economic condition is described for 2018 employment levels, wage rates, input prices, and economic linkages. Economic output is converted to a consistent dollar year (2018$

United States dollars) and reported as annual averages in 5-year increments over the planning horizon (2019–2023, 2024–2028, 2029–2033, and 2034–2038), as well as for the average effects for the 20-year horizon. These results are described in the tables below.

Over the course of the 20-year planning horizon, increased coal production is expected to result in increased employment in the coal sector within the socioeconomic analysis area. While forecasted coal production in the planning area is expected to increase to its peak in 2026, it begins to decline by 2027 through the remainder of the planning horizon; however, production levels are forecasted to remain higher in 2038 than they were in 2019. Coal production over the planning horizon is estimated to support a total of 1,960 direct, indirect, and induced average annual jobs in the socioeconomic analysis area. These jobs would support economic activity of approximately $152.2 million in average annual labor income and $733.9 million in average annual economic output. **Table 3-17**, below, describes the average annual direct, indirect, and induced effects over the 20-year planning horizon.

Table 3-17
Average Annual Economic Effects 2019–2038

Impact Type	Employment	Labor Income	Output
Direct Effect	754	$78,365,873	$512,974,756
Indirect Effect	528	$43,589,971	$132,462,459
Induced Effect	678	$30,202,414	$88,464,526
Total Effect	1,960	$152,158,259	$733,901,741

Forecasted coal production begins to increase over the first 5 years of the planning horizon, with production supporting approximately 2,057 direct, indirect, and induced average annual jobs. These jobs would support approximately $159.5 million in average annual income and $769.9 million in average annual output. **Table 3-18**, below, shows the detailed effects.

Table 3-18
Average Annual Economic Effects 2019–2023

Impact Type	Employment	Labor Income	Output
Direct Effect	792	$82,147,534	$538,195,276
Indirect Effect	554	$45,748,237	$139,015,470
Induced Effect	710	$31,654,611	$92,723,152
Total Effect	2,057	$159,550,382	$769,933,898

Forecasted coal production for the socioeconomic analysis area reaches its peak in 2026 at 23.9 MMst and then marginally falls to 21.6 MMst in 2027. The 21.6 MMst production level is forecasted to remain constant through 2038 (see **Appendix C**). Coal production is estimated to support approximately 2,009 direct, indirect, and induced average annual jobs in the socioeconomic analysis area. These jobs would support approximately $155.9 million in average annual income and $752.2 million in average annual output. **Table 3-19**, below, provides detailed effects.

Table 3-19
Average Annual Economic Effects 2024–2028

Impact Type	Employment	Labor Income	Output
Direct Effect	773	$80,348,275	$525,778,041
Indirect Effect	541	$44,672,295	$135,753,533
Induced Effect	695	$30,968,394	$90,706,242
Total Effect	2,009	$155,988,964	$752,237,816

Coal production is forecasted to remain constant at 2027 levels through the remainder of the planning period. While US domestic coal market demand is expected to decrease (AEO 2019), production levels at mines in the decision area are expected to be sustained through the US export market and global coal demand. No production changes are forecasted from 2027 through 2038; therefore, the average annual effects for the 2029–2033 and 2034–2038 5-year periods are the same.

Forecasted production is estimated to support approximately 1,888 direct, indirect, and induced average annual jobs. These jobs are estimated to support approximately $146.5 million in average annual income and $706.7 million in average annual output. **Table 3-20**, below, provides detailed effects for the 2029–2033 and 2034–2038 5-year periods.

Table 3-20
Average Annual Economic Effects 2029–2033 and 2034–2038

Impact Type	Employment	Labor Income	Output
Direct Effect	726	$75,483,842	$493,962,853
Indirect Effect	508	$41,969,676	$127,540,417
Induced Effect	726	$29,039,326	$85,214,355
Total Effect	1,888	$146,546,844	$706,717,626

Revenue Analysis

Information on collected taxes associated with coal production are discussed in the Affected Environment. The effects analysis provides a quantitative assessment of the impacts on federal, state, and local government revenues associated with production. This analysis is based on forecasted federal production volumes in the planning area.

Mineral revenues associated with coal production were calculated by estimating the taxable market value of coal production in the socioeconomic analysis area through federal coal production forecasts over the planning horizon. Coal price forecasts were calculated by taking EIA-forecasted high economic growth and low economic growth prices weighted by the volume of production.

County Gross Proceeds Taxes

Counties impose gross proceeds taxes on the short tons of coal produced by the contract sales. The county treasurer collects the taxes and disburses them proportionately to the appropriate taxing jurisdiction (Nowakowski 2018). Gross proceeds taxes were forecasted by applying the 5 percent flat tax rate to the forecasted market value of production. Approximately $17,427,594 in average annual county mineral revenues is forecasted to be generated over the 20-year

planning horizon. Forecasted gross proceeds taxes over the planning horizon in 5-year increments are available in **Table 3-21**, below.

Table 3-21
Total County Mineral Revenues (2018$)

5-Year Increments	Average Annual Gross Proceed Contributions	Estimated Total Production Gross Proceeds Tax Contributions
2019–2023	$18,281,480	$91,407,400
2024–2028	$17,863,662	$89,318,310
2029–2033	$16,782,616	$83,913,080
2034–2038	$16,782,616	$83,913,080
Planning Horizon Totals	**$17,427,594**	**$348,551,870**

State Revenues

State-level contributions were forecasted by adding the resource indemnity and groundwater assessment tax, the state severance tax, and the federal royalty disbursements. The severance tax and resource indemnity and groundwater assessment tax revenues were estimated by applying the severance tax rate to the forecasted market value of production. The ONRR collects 100 percent of federal royalties, but disburses 49 percent to the state where extraction occurs (ONRR 2019a). Approximately $86,053,623 would be generated in average annual state mineral revenues. **Table 3-22**, below, shows average annual state mineral revenues over the planning horizon in 5-year increments.

Table 3-22
Average Annual State Mineral Revenues

5-Year Increments	Federal Royalty Disbursements	State Severance Taxes	Resource Indemnity and Groundwater Assessment Tax	State Totals
2019–2023	$20,800,302	$54,844,440	$14,625,184	$90,269,926
2024–2028	$20,324,917	$53,590,985	$14,290,930	$88,206,833
2029–2033	$19,094,924	$50,347,848	$13,426,093	$82,868,866
2034–2038	$19,094,924	$50,347,848	$13,426,093	$82,868,866
Planning Horizon	**$19,828,767**	**$52,282,781**	**$13,942,075**	**$86,053,623**

Article XI, Section 5 of the Montana state constitution requires that 50 percent of collected state severance taxes are deposited in the statewide Montana Coal Severance Tax Trust Fund. Fund disbursements are described in the *Affected Environment*. Forecasted increases to the Montana Coal Severance Tax Trust Fund and average annual contributions over the planning horizon are described in **Table 3-23**, below.

Federal Mineral Revenues

Federal mineral revenues were calculated by estimating federal royalty collections, federal rents, and federal coal excise taxes. The ONRR collects 100 percent of federal mineral royalties and returns 49 percent to the state where extraction occurs. Of the 51 percent retained, approximately 40 percent of onshore revenues are sent to the reclamation fund, 10 percent are sent to the US Treasury, and 1 percent are retained for administrative purposes (ONRR 2019d).

Table 3-23
Montana Coal Severance Tax Trust Fund, 2019–2038

5-Year Increments	Average Annual Contributions to Montana Coal Severance Tax Trust Fund	Estimated Net Increases to Montana Coal Severance Tax Trust Fund
2019–2023	$27,422,220	$137,111,100
2024–2028	$26,795,493	$133,977,466
2029–2033	$25,173,924	$125,869,621
2034–2038	$25,173,924	$125,869,621
Planning Horizon Totals	**$26,141,390**	**$522,827,808**

Because this analysis assumes federal coal production would continue to be produced from recoverable reserves, annual rents are anticipated to remain constant at levels reported in the *Affected Environment*. Domestic coal producers are also required to pay a coal excise tax on coal production. The revenue that the IRS collects from the coal excise tax goes directly into the BLDTF to support medical services for miners with black lung disease (ONRR 2019c). Coal excise taxes were restructured at the beginning of calendar year 2019 to $0.25 per short ton of produced coal (minus the tonnage of moisture content) but may not exceed 2 percent of the market value of production (ONRR 2019c).

Average annual federal mineral revenues across the planning horizon would be approximately $26,349,245. **Table 3-24**, below, shows forecasted average annual federal collections in 5-year increments.

Table 3-24
Average Annual Federal Mineral Revenues

5-Year Increments	Coal Royalties	Rent Contributions	Coal Excise Tax Contributions	Federal Totals
2019–2023	$108,246,471	$101,015	$5,885,000	$27,635,309
2024–2028	$105,772,529	$101,015	$5,750,500	$27,006,021
2029–2033	$99,371,548	$101,015	$5,402,500	$25,377,825
2034–2038	$99,371,548	$101,015	$5,402,500	$25,377,825
Planning Horizon Totals	**$103,190,523**	**$101,015**	**$5,610,125**	**$26,349,245**

3.9.3 Cumulative Impacts

Past, present, and reasonably foreseeable future actions in and adjacent to the decision area have the potential to affect coal production outside of BLM management decisions.

In this analysis, induced effects, which are those occurring from changes in household spending as a result from changes in household income, are higher than indirect effects, which are those occurring from economic changes with backward-linked industries. This is partially due to the inclusion of Yellowstone County as part of the socioeconomic analysis area. The BLM included Yellowstone County due to intercounty commuting patterns for regional coal employment. While no coal production occurs in Yellowstone County, potential actions occurring in or adjacent to the decision area outside of BLM management that may affect coal production in Big Horn, Richland, or Rosebud Counties may disproportionately affect Yellowstone County due to employment patterns.

The BLM does not expect new coal mines on federal mineral estate in the decision area. New leases authorized in the decision area would maintain production at existing mines; however, future coal mining operations may be developed on private lands located adjacent to the decision area and on Indian lands located in the decision area.

Nonfederal coal accounts for approximately 42 percent of total coal production in Big Horn, Richland, and Rosebud Counties and employs workers from Yellowstone County. Direct spending and employment from nonfederal coal producers have additional direct, indirect, and induced economic effects that ripple throughout the state and local economies. Nonfederal coal production is not subject to federal royalty rates or federal rent; however, companies must pay corporate income taxes to the IRS and a coal excise tax upon mining. Current coal excise rates are $0.55 per ton of coal produced for subsurface mines and $0.25 per ton of coal for surface mines, but coal excise taxes are limited to 2 percent of the market value (ONRR 2019c). The IRS transfers collected funds to the BLDTF (ONRR 2019c). Changes in nonfederal production may have additional economic effects not described in the *Environmental Consequences*.

Coal market demand has the potential to vary from EIA forecasts based on market factors driving changes in demand for the domestic fuel generation energy mix. The abundance and low prices of natural gas are expected to reduce the demand for coal production for energy generation and lead to the retirements of less efficient coal plants through 2050. While global market demand is expected to increase, driven by coal-powered generation in China, India, and Southeast Area, US coal exports are not expected to increase due to competitiveness of suppliers closer to major global markets (AEO 2019; IEA 2019). More information on domestic and international coal markets is described in **Appendix D**, Coal Market Supplementary Report.

While the US coal market share is not expected to increase over the 20-year planning horizon of the SEIS/RMPA, the Decker Mine and Spring Creek Mine Complex are projecting increases in exported coal for the socioeconomic analysis area. Export-driven coal production would rely on regional competitiveness compared with global suppliers closer to major global coal consumers, such as China and India. Economic viability of export-driven coal production is also dependent on other factors outside BLM management decisions, such as exchange rates, trade barriers, and changes in transportation costs.

Forecasted reductions in coal demand for the fuel generation energy mix have the potential to reduce coal production in the socioeconomic analysis area. Reductions in coal production would be due to the inability of mines to compete for future coal supply contracts, which may lead to losses in employment, labor income, value added, and total economic output. Reductions in coal production would likely occur on mines producing lower-quality coal than the open market demands (IEEFA 2019). Collected fiscal revenues associated with coal production would also be reduced, and revenue losses may have disproportionate effects on counties in the socioeconomic analysis area that rely on coal revenues to support public and social services.

3.10 UNAVOIDABLE ADVERSE IMPACTS

Section 102(C) of NEPA mandates disclosure of "any adverse environmental effects which cannot be avoided should the proposal be implemented." These are impacts for which there are no mitigation measures or for impacts that remain even after the implementation of mitigation

measures. Implementation of the SEIS/RMPA and subsequent activity- or project-specific coal mining would result in unavoidable adverse impacts on some resources. The impacts resulting from implementation of the SEIS/RMPA are described in this chapter. As discussed, below, under the section on irreversible and irretrievable impacts, the specific nature and extent of the implementation-level impacts cannot be clearly defined due to unknowns regarding site-specific implementation and associated mitigation measures.

In general, development and surface-disturbing activities associated with coal mining would result in unavoidable adverse impacts, including soil compaction and erosion, the loss of vegetation cover, the spread of noxious weeds, disturbance to and displacement of wildlife, visual intrusions on the landscape, and the potential loss of cultural or paleontological resources.

3.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Section 102(2)(C) of NEPA and Section 1502.16 of the CEQ regulations for implementing NEPA require that the discussion of environmental consequences include a description of ". . . any irreversible or irretrievable commitment of resources which would be involved in the proposal should it be implemented."

Coal mining from lands acceptable for further consideration for coal leasing would result in the irreversible and irretrievable loss of those coal resources. In addition, coal mining development and surface disturbance would have potentially irretrievable and potentially irreversible effects on vegetation, wildlife habitat, and livestock grazing if reclamation efforts prove unsuccessful. Irreversible effects on soils and water quality could occur depending on the implementation of mitigation measures and their efficacy.

3.12 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Section 102(C) of NEPA requires discussion of the relationship between local, short-term uses of the human environment, and the maintenance and enhancement of long-term productivity of resources. "Short term" is defined as anticipated to occur within 1 to 5 years of implementation of the activity. "Long term" is defined as following the first 5 years of implementation but within the life of the SEIS/RMPA (forecasted to be 20 years).

Coal mining and the resulting surface disturbance would result in various short-term adverse impacts, such as increased localized soil erosion or damage to wildlife habitat.

Management actions and best management practices would minimize the effect of short-term uses and reverse the change during the long term; however, coal mining and the associated infrastructure could result in some long-term productivity impacts regardless of reclamation activities.

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CHAPTER 4
COORDINATION AND CONSULTATION

4.1 INTRODUCTION

This chapter describes the public outreach and participation opportunities associated with developing this SEIS/RMPA. As part of the process, the BLM consulted and coordinated with tribes, government agencies, and other stakeholders.

The BLM conducts land use planning in accordance with NEPA requirements, CEQ regulations, and DOI and BLM policies and procedures for implementing NEPA. NEPA and associated laws, regulations, and policies require the BLM to seek public involvement early in and throughout the planning process. This is to develop a reasonable range of alternatives to proposed actions and to prepare environmental documents that disclose the potential impacts of proposed actions and alternatives.

The BLM involved the public and other agencies by way of *Federal Register* notices, public and informal meetings, individual contacts, media releases, planning newsletters, and the Miles City SEIS/RMPA ePlanning website.[1]

4.2 PUBLIC COLLABORATION AND OUTREACH

Public involvement is a vital and legal component of both the SEIS and RMPA processes. Public involvement vests the public in the decision-making process and allows for full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR 1506.6, thereby ensuring that federal agencies make a diligent effort to involve the public in the NEPA process.

The BLM involved the public in the Miles City SEIS/RMPA during public scoping to determine the scope of issues and alternatives to be addressed in the SEIS/RMPA.

[1] https://go.usa.gov/xmbE4

The public scoping phase has been completed and is described below; the public outreach and collaboration phases are ongoing throughout the SEIS/RMPA process. The public can obtain information from the BLM's ePlanning website.

4.3 PUBLIC SCOPING

The purpose of the public scoping process is to identify issues and planning criteria that should be considered in the SEIS/RMPA and to initiate public participation in the planning process. Detailed information about public scoping can be found in the Miles City SEIS/RMPA Scoping Report (see BLM's ePlanning website).

4.3.1 Notice of Intent

The formal public scoping process for the Miles City SEIS/RMPA began with the publication of the NOI in the *Federal Register* on November 28, 2018 (FR Doc. 2018–25847); the BLM also posted the NOI on the ePlanning website. It notified the public of the BLM's intent to prepare an SEIS and potential amendment to the 2015 RMP to respond to the court's order. The NOI included a call for coal and other resource information, and identified revision topics. The scoping period lasted 30 days, ending on December 28, 2018.

4.3.2 ePlanning Website

The BLM maintains an ePlanning website with information related to the development of the SEIS/RMPA. The website includes background documents, public meeting information, and contact information.

4.3.3 News Releases

During the public scoping period (November 29 to December 28, 2018), the BLM sent press releases to 39 media contacts, 2 television stations, and 2 radio stations in the decision area. These press releases announced public involvement opportunities and the scoping meeting. A complete list of media outlets where the BLM sent press releases is included as *Appendix B* of the scoping report.

4.3.4 Other Notifications

In addition to press releases, the BLM notified members of the public about the scoping process via newspapers, both in and outside the planning area. The newspapers published local and regional articles and news bulletins regarding some aspect of the SEIS/RMPA process.

4.3.5 Scoping Meetings

Following publication of the NOI for the Miles City SEIS/RMPA, the BLM conducted one scoping meeting in Miles City, Montana, on December 13, 2018. The meeting included a PowerPoint presentation describing the purpose of the SEIS/RMPA, the project approach, and opportunities for public involvement. Materials presented and additional information can be found in the scoping report.

4.3.6 Scoping Comments Received

The BLM received 32 unique written comment letters during the public scoping period (November 29 to December 28, 2018). These submissions contained 447 unique comments. Detailed information about the comments received and about the public outreach process can be found in the Miles City SEIS/RMPA Scoping Report. The issues identified during public

scoping and outreach helped refine the list of planning issues, which guided the development of alternatives management strategies for the SEIS/RMPA.

4.4 FUTURE PUBLIC INVOLVEMENT

Public participation will be ongoing throughout the remainder of the SEIS/RMPA development process. One substantial part of the process is providing an opportunity for the public to comment on this Draft SEIS/RMPA during the comment period. In the Proposed RMPA/Final SEIS, the BLM will respond to all substantive comments received during the 90-day comment period. The BLM will issue the ROD after the release of the Proposed RMPA/Final SEIS, the governor's consistency review, and any resolution of protests received on the Proposed RMPA/Final SEIS.

4.5 LIST OF PREPARERS

Affiliation/Preparer	Name	Role/Responsibility
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	Ben Rice	GIS Specialist
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	Dena Sprandel-Lang	Outdoor Recreation Planner
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Affiliation/Preparer	Name	Role/Responsibility
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	Kevin Doyle	Cultural Resources
	Zoe Ghali	Socioeconomics
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	Susan Kemball-Cook, PhD	Air Quality and Climate Change
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4.6 TRIBAL CONSULTATION

Consultation with Native American tribes is part of the NEPA process and a requirement of FLPMA. On November 19, 2018, the BLM MCFO sent letters to the following tribes, initiating government-to-government consultation. The BLM MCFO invited them to be cooperating agencies on the SEIS/RMPA and asked for comments during the scoping period. Only the Crow Creek Sioux Tribe responded. They had no comments at the time. Government-to-government consultation will continue throughout the SEIS/RMPA process.

- Cheyenne River Sioux
- Chippewa Cree
- Crow
- Crow Creek Sioux
- Eastern Shoshone
- Fort Peck, Assiniboine, and Sioux
- Lower Brule Sioux
- Mandan, Hidatsa, and Arikara Nation
- Northern Arapaho
- Northern Cheyenne
- Oglala Sioux
- Rosebud Sioux
- Standing Rock Sioux
- Turtle Mountain
- Yankton Sioux

4.7 COOPERATING AGENCIES

The BLM is the lead agency for the SEIS/RMPA. On November 26, 2018, the BLM wrote to 27 local, state, and federal agencies, inviting them to participate as cooperating agencies for the SEIS/RMPA. Eight entities agreed to participate in the SEIS/RMPA as cooperating agencies. The BLM has held cooperating agency meetings throughout the process and will continue to meet with them throughout preparation of the Final SEIS/Proposed RMPA. The cooperating agencies are the following: USFWS, US Environmental Protection Agency, Office of Surface Mining

Reclamation and Enforcement, Montana Department of Natural Resources and Conservation, McCone County, Sheridan County, Prairie County, and Rosebud County.

- Big Horn County Commission
- Carter County Commission
- Custer County Commission
- Daniels County Commission
- Dawson County Commission
- Fallon County Commission
- Garfield County Commission
- McCone County Commission
- Richland County Commission
- Roosevelt County Commission
- Powder River County Commission
- Prairie County Commission
- Rosebud County Commission
- Sheridan County Commission
- Wibaux County Commission
- Office of the Governor, Montana
- Montana Department of Agriculture
- Montana Department of Environmental Quality
- Montana Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State Historic Preservation Office
- United States Army Corps of Engineers
- United States Department of the Interior – Bureau of Indian Affairs
- United States Department of the Interior – Office of Surface Mining and Reclamation
- United States Environmental Protection Agency, Region 8
- United States Fish and Wildlife Service
- United States Geological Survey Energy Resources Program

4.8 MONTANA STATE HISTORIC PRESERVATION OFFICE CONSULTATION

The BLM MCFO will initiate Section 106 consultation with the State Historic Preservation Office under the National Historic Preservation Act,[2] in order to identify and protect cultural resources in the decision area. The BLM MCFO will continue to coordinate with the SHPO through the Final SEIS/RMPA.

4.9 US FISH AND WILDLIFE COORDINATION

On April 11, 2019, the BLM MCFO sent a letter to the USFWS inquire whether reinitiation of the consultation that occurred for the 2015 RMP/EIS was necessary for this SEIS/RMPA. The biological assessment for the 2015 RMP/EIS had determinations of "may affect, not likely to adversely affect," for all ESA listed species, to which the USFWS concurred on July 10, 2015. The USFWS concurred with the BLM that reinitiation of consultation is not required for this SEIS/RMPA because: (1) all action alternatives and associated impacts under consideration in this SEIS/RMPA are equal in scope to, or are lesser in scope than, actions and impacts previously analyzed with regard to threatened and endangered species and critical habitat in the 2015

[2] Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of federally funded projects on historic properties.

biological assessment; and (2) none of the criteria outlined in 50 CFR 402.16 regarding reinitiation are met. The USFWS is also a cooperating agency on this SEIS/RMPA, and coordination will continue through completion of the Final SEIS/RMPA.

4.10 AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE SEIS/RMPA ARE SENT

The following agencies and organizations will receive a copy of the Draft SEIS/RMPA, Final SEIS/Proposed RMPA, and RMPA/ROD.

- Big Horn County Commission
- Carter County Commission
- Custer County Commission
- Daniels County Commission
- Dawson County Commission
- Fallon County Commission
- Garfield County Commission
- McCone County Commission
- Richland County Commission
- Roosevelt County Commission
- Powder River County Commission
- Prairie County Commission
- Rosebud County Commission
- Sheridan County Commission
- Wibaux County Commission
- Office of the Governor, Montana
- Montana Department of Agriculture
- Montana Department of Environmental Quality
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State Historic Preservation Office
- United States Army Corps of Engineers
- United States Department of the Interior – Bureau of Indian Affairs
- United States Department of the Interior – Office of Surface Mining and Reclamation
- United States Environmental Protection Agency, Region 8
- United States Fish and Wildlife Service
- United States Geological Survey Energy Resources Program

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Glossary

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GLOSSARY

100-year floodplain. The 100-hundred year floodplain is the area inundated by the 100-year flood or the 1 percent annual exceedance probability flood. It is the flood event that has a 1 percent chance of being equaled or exceeded in any single year. It is often mistakenly thought of as the flood that occurs once every 100 years. In actuality, if one has a project located within the 100-year floodplain and the project life is expected to be 20 years, it would have an 18 percent chance of experiencing flood damage due to a 100-year flood. For a project with an anticipated life of 15 years, the chance of incurring flood damage due to a 100-year flood would be 14 percent.

1976 Federal Leasing Law. The 1976 Federal Leasing Law mandates that 49 percent of collected federal royalties are returned to the state where the natural resource extraction occurred. The remainder of the collected federal royalty rates is distributed to federal funds and administration fees.

Alluvial valley floor. An area of unconsolidated stream-laid deposits holding streams with water availability sufficient for sub irrigation or flood irrigation agricultural activities (P.L. 95-87).

Black Lung Disability Trust Fund. The Black Lung Disability Trust Fund was developed to ensure the coal industry bears the burden associated with providing black lung benefits.

Capacity utilization. Capacity utilization rates identify the ratio of annual coal produced to annual productive capacity and help identify the operating rate of a coal mine.

Coal excise tax. A production tax levied on domestic coal production within the United States. Revenue is collected by the IRS and funds the Black Lung Disability Trust Fund. Coal excise taxes were restructured at the beginning of calendar year 2019 to $0.25 per short ton of produced coal but may not exceed 2 percent of the market value of production.

Critical habitat. An area occupied by a threatened or endangered species "on which are found those physical and biological features: (1) essential to the conservation of the species, and

(2) which may require special management considerations or protection" (as defined under the ESA of 1973).

Crucial habitat. Parts of the habitat necessary to sustain a wildlife population at critical periods of its life cycle. This is often a limiting factor on the population, such as breeding or winter habitat.

Crucial winter range. That portion of the winter range on which a wildlife species is dependent for survival during periods of heaviest snow cover.

Cultural resource. The present expressions of human culture and the physical remains of past activities, such as historic buildings, structures, objects, districts, landscapes, and archaeological sites. These resources can be significant in the context of national, regional, or local history, architecture, archaeology, engineering, or culture. They also may include sacred sites and natural features of landscapes that are significant to living communities.

Cultural viewshed. The geographical area that is visible from a location that contributes to the historic or cultural resource integrity of a historic property or cultural landscape values. It includes such information as whether the viewpoint or viewed landscape includes designated scenic or cultural features, historic properties, cultural landscapes, or other specially designated areas.

Greater sage-grouse habitat. A specific environment or set of environmental conditions suitable for occupancy by greater sage-grouse often typified by the presence of sagebrush. Sage-grouse habitat may be further defined by the season of use (i.e., winter, breeding, and brood rearing); each has its own set of different environmental conditions. Each planning area may further define seasonal habitat characteristics based on local ecological conditions.

- Winter: Greater sage-grouse select winter concentration areas where sagebrush is 10 to 14 inches above the snow, with a canopy ranging from 10 to 30 percent. Wintering areas may also be on flat to generally southwest-facing slopes or in areas where sagebrush height may be less than 10 inches (25 centimeters), but the snow is routinely blown clear by wind. In the most severe winter weather conditions, greater sage-grouse will often be restricted to tall stands of sagebrush usually located on deeper soils in or near drainages.
- Nesting: The most suitable nesting habitat includes a mosaic of sagebrush with horizontal and vertical structural diversity. A healthy understory of native grasses and forbs provides cover for concealment of the nest and hen from predators, herbaceous forage for pre-laying and nesting hens, and insects as prey for chicks and hens. Preferred nesting cover may vary dependent on local potential habitat conditions.
- Brood rearing: Early brood-rearing habitat must provide adequate cover (sagebrush canopy cover of 10 to 25 percent is preferable) adjacent to areas rich in forbs and insects to assure chick survival during this period. Typically, mosaics of upland sagebrush and other habitats (for example, wet meadows or riparian areas) together provide abundant insects and forbs for hens and chicks. All greater sage-grouse

gradually move from sagebrush uplands to more mesic areas during the late brood-rearing period (3 weeks post hatch) in response to summer desiccation of herbaceous vegetation. These areas provide an abundance of forbs and insects for both hens and chicks. Brood-rearing habitats can include sagebrush habitats as well as riparian areas, wet meadows, and alfalfa or other agriculture fields.

Gross proceeds tax. The county-level flat tax of 5 percent on the taxable value of production imposed by counties in Montana.

Habitat. In wildlife management, the major elements of habitat are considered to be food, water, cover, and living space. The definition includes the following two usages: a species-specific environment or environmental conditions suitable for occupancy by that species, or a particular land cover type that provides an environment or environmental conditions suitable for occupancy by many species.

Habitat connectivity. Landscape elements that connect similar patches of habitat in sufficient quantity and arrangement to allow for the movement of wildlife. These linkage zones are where species migrate and intermingle to ensure genetic interchange and, consequently, long-term survival.

Historic property. Cultural resources—such as historic buildings, structures, objects, districts, or archaeological sites—that are listed on, or eligible for inclusion on, the National Register of Historic Places.

IMPLAN. IMPLAN (Impact Analysis for Planning) is an input-output model designed to identify regional economic impacts in response to a change in the economy.

Input-output (IO). A linear, quantitative model that identifies and represents economic linkages between different branches of a regional economy. Input-output is a static model that measures output in a regional economy at a singular point in time in response to a change to that regional economy.

Lek. A traditional breeding area for greater sage-grouse and sharp-tailed grouse in which males assemble to establish dominance, display, and breed. Leks are also called dancing grounds or strutting grounds.

Location quotients. Location quotients are a regional economic measurement intended to identify the concentration of a particular industry within a specified region compared with a larger reference region.

Mine mouth. Mine mouth electric plants are coal-burning electricity-generating power plants that purchase directly from coal mines. They report prices to the Energy Information Administration Agency within the US Department of Energy.

Montana Coal Severance Tax Trust Fund. Article XI, Section 5 of the Montana State Constitution requires that 50 percent of collected coal severance taxes be allocated to the Coal Severance Tax Trust Fund, which supports renewable energy development projects, regional

water systems, economic development opportunities, and state-operated education facilities. Counties can take loans against the fund.

Municipal watershed. A watershed that serves a public water system as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in state safe drinking water regulations.

National Register of Historic Places (NRHP). A listing of resources that are considered significant at the national, state, or local level and that have been found to meet specific criteria of historic significance, integrity, and age.

Office of Natural Resource Revenue. The Office of Natural Resource Revenue is an office with the US Department of the Interior responsible for collecting, accounting, and verifying natural resource and energy revenues due to states, American Indians, and the US Treasury.

Raptor. Bird of prey with sharp talons and strongly curved beaks (hawks, falcons, owls, and eagles).

Recoverable reserves. Recoverable reserves represent the tonnage of coal that can be recovered from existing coal reserves at producing coal mines.

Resource indemnity trust and groundwater assessment tax. A tax the state of Montana collects on the gross taxable value of mineral production to fund a Montana Resource Indemnity Trust intended to reclaim land disturbed from natural resource extraction. This tax is applied to coal production.

Riparian. An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent on free water in the soil.

Royalty rate. The Office of Natural Resource Revenue collects federal royalty rates on minerals extracted on federal land. Federal royalty rates vary by state. Montana has a federal royalty rate of 12.5 percent; however, companies are allowed to negotiate lower effective rates upon securing leasing rights. In Montana, the average effective royalty rate is 11.61 percent.

Sagebrush habitat. A land cover type with sagebrush as the dominant plant species. Sagebrush habitat provides environmental conditions for many species associated with sagebrush for all or part of their life cycle. Examples of sagebrush-associated species include greater sage-grouse, sage sparrows, sage thrashers, and common sagebrush lizards.

Sage-grouse core area. MFWP core areas contain habitat associated with Montana's highest densities of sage-grouse (25 percent quartile), based on male counts, or sage-grouse lek complexes and associated habitat important to sage-grouse distribution. Core areas are consistent with priority habitat management areas.

Sage-grouse general habitat management areas. Areas with or without ongoing or imminent impacts containing sage-grouse habitat outside the priority areas. Management actions

would maintain habitat for sustainable sage-grouse populations to promote movement and genetic diversity. Areas are delineated based on sage-grouse habitat.

Sage-grouse priority habitat management areas. Areas with limited impacts containing substantial and high-quality sage-grouse habitat that supports sustainable sage-grouse populations. Management actions would emphasize the protection and enhancement of sustainable sage-grouse populations. Areas are delineated using "key," "core," and connectivity data or maps and other resource information.

Section 106 process. Refers to a section of the National Historic Preservation Act of 1966 (NHPA) that requires federal agencies to take into account the effects of their actions on historic properties. The NHPA created the Advisory Council on Historic Preservation (ACHP) and authorized the ACHP to issue regulations governing the implementation of Section 106. These regulations are set forth in 36 CFR 800.

Section 7 consultation. The requirement of Section 7 of the ESA that all federal agencies consult with the USFWS or the National Oceanic and Atmospheric Administration Fisheries if a proposed action might affect a federally listed species or its critical habitat.

Sensitive species. Species designated by a BLM state director, usually in cooperation with the state agency responsible for managing the species and state natural heritage programs, as sensitive. They are those species that could become endangered in or extirpated from a state or within a significant portion of its distribution; are under status review by the USFWS or National Oceanic and Atmospheric Administration Fisheries; are undergoing significant current or predicted downward trends in habitat capability that would reduce the species' existing distribution; are undergoing significant current or predicted downward trends in population or density such that federally listed, proposed, candidate, or state-listed status may become necessary; typically have small and widely dispersed populations; inhabit ecological refugia or other specialized or unique habitats; or are state-listed but may be better conserved through the application of BLM sensitive species status.

Severance tax. Severance taxes are statewide taxes imposed on the extraction of natural resources intended for consumption. The severance tax for Montana is 15 percent for surface coal.

Special status species. Include the following: species that the Secretary of the Interior has officially proposed for listing as threatened or endangered, species the Secretary of the Interior has officially listed as threatened or endangered under the provisions of the ESA, species the USFWS or National Oceanic and Atmospheric Administration Fisheries designates as candidates for listing as threatened or endangered, species listed by a state in a category implying but not limited to potential endangerment or extinction, and sensitive species as designated by a BLM state director.

Ton. The equivalent of 2,000 pounds. All tons in this EIS are short tons.

Vegetation community. An assemblage of plant populations in a common spatial arrangement.

Vegetation type. A plant community with distinguishable characteristics described by the dominant vegetation present.

Waterway. Any body of water including lakes, rivers, streams, and ponds whether they contain aquatic life.

Wetlands. Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wildlife habitat. A species-specific environment and environmental conditions suitable for occupancy by that species, or a particular land cover type that provides an environment and environmental conditions suitable for occupancy by many species.

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Appendix A
Coal Screening Process

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APPENDIX A
COAL SCREENING PROCESS

A.1 INTRODUCTION

As part of the land use planning process (regulated under 43 CFR 1600), surface management agencies are charged with filtering lands overlaying federally administered coal through four screens. These screens ultimately result in the allocation of lands as acceptable for further consideration for leasing and development, giving consideration to resource conflicts with coal development (43 CFR 3420.1–4(d)).

This appendix describes the screening process for coal resources undertaken by the US Department of the Interior, Bureau of Land Management (BLM) for the Miles City Field Office (MCFO), complying with 43 CFR 3420.1-4(e). The screening process informs potential land use decisions regarding coal leasing availability under the alternatives analyzed in the MCFO Supplemental Environmental Impact Statement (SEIS) and Resource Management Plan Amendment (RMPA).

The BLM prepared resource management plans and supporting coal screens for the 1996 Big Dry RMP and 1985 Powder River RMP, which authorize federal coal resources in the planning area. The 2015 Proposed RMP/Final EIS carried forward these coal screening results. In other words, Alternative A represents the coal screen results from the Big Dry and Powder River RMPs. To date, 34,700 acres of BLM-administered federal coal have been leased under these plans in the MCFO.

The total acres acceptable for further consideration for leasing and development based on this coal screening process are in **Chapter 2**, **Table 2-1**, **Table 2-2**, and **Table 2-3**.

A.2 REGULATORY OVERVIEW

Federal coal resources are governed by Section 522(b) of the Surface Mining Control and Reclamation Act and by the Federal Land Management Policy Act and its implementing regulations at 43 CFR 3400 and 43 CFR 1600. One aspect of coal leasing governed under these regulations is land use planning (43 CFR 3420.1–4(d); 43 CFR 1610.7-1) and the review of federal lands for suitability for coal leasing (43 CFR 3461). These regulations identify certain lands as unsuitable for surface mining or surface mining operations because they contain

significant values that conflict with coal development. These include components of the National Wildlife Refuge System, the National System of Trails, and incorporated cities, towns, and villages, among other entities. Other unsuitability criteria include critical habitat for threatened and endangered species and cultural resources listed on the National Register of Historic Places.

The regulations at 43 CFR 3420 govern the land use planning process as it pertains to coal, including the four coal screens for identifying areas acceptable for further consideration for leasing and unsuitable for surface mining or surface mining operations (43 CFR 3420.1–4). Under this process, the BLM must complete the following:

1. Identification of coal with development potential—Lands determined to have development potential are considered acceptable for further consideration for leasing, and are applied to the remaining coal screens. Lands determined to not have development potential are eliminated from further consideration for leasing.
2. Application of unsuitability criteria—Lands with coal potential are assessed with procedures outlined in 43 CFR 3461. Lands with coal potential may be eliminated from further consideration for leasing if determined unsuitable without exception pursuant to Section 522(b) of the Surface Mining Control and Reclamation Act. In accordance with 43 CFR 3461.2-1, the BLM could, based on additional site-specific surveys or changes in resource conditions, change the unsuitability determination of a given tract at the activity planning stage.
3. Multiple-use conflict analysis—43 CFR 3420.1-4e(3) states that "multiple land use decisions shall be made which may eliminate additional coal deposits from further consideration for leasing, to protect resource values of a locally important or unique nature not included in the unsuitability criteria." Multiple-use values may include possible oil and gas development and soil, forest, wildlife, recreation, agriculture, air, and watershed resources. Lands with coal potential may be eliminated from further consideration for leasing where multiple uses conflict.
4. Surface owner consultation—This screen requires the BLM to consult with qualified surface owners whose land overlies federal coal with development potential. The BLM asks the qualified surface owners for their preference for or against offering the coal deposits under their land for lease. Lands with coal potential may be eliminated from further consideration for leasing based on qualified surface owner preference.

A.3 COAL SCREENING RESULTS

A.3.1 Screen 1—Coal Development Potential

To evaluate coal potential in the decision area, the BLM consulted with the Montana Bureau of Mines and Geology (MBMG) and the United States Geological Survey (USGS). The BLM and USGS reviewed available data from both agencies, developed criteria for evaluating coal potential, and compared new models developed by the USGS with the USGS Powder River Basin Report from 2015. Drill hole locations from the USGS were reviewed initially for completeness and representativeness to determine what data gaps merited infilling with BLM data. The USGS's dataset was adequate for the coal model, because it covered much of the same geographic area as the BLM's drill hole data and had similar informational value. The USGS

drill hole data was correlated with coal beds, and a predictive model for coal potential was created.

The USGS recommended a set of criteria to define areas with coal potential and areas without coal potential based on coal content and coal accessibility. BLM geologists concurred with these thresholds. This methodology is materially the same as that used for the 2015 report. The BLM used this classification and methodology (which can be reviewed at the BLM Miles City Field Office) to identify the locations with coal potential under this screen.

There are approximately 1,749,140 acres of BLM-administered federal coal in the planning area. **Figure A-1** displays the results of Screen 1.

A.3.2 Screen 2—Unsuitability

The BLM MCFO interdisciplinary team of resource specialists reviewed available data and solicited expertise from state and federal agencies (for example, the Montana Fish, Wildlife and Parks; Montana Department of Natural Resources and Conservation; US Fish and Wildlife Service; and USGS) to assess the applicability of each of the 20 unsuitability criteria to the decision area.

The acres designated unsuitable under each unsuitability criterion are tabulated under **Table A-1**. Areas identified as unsuitable under each unsuitability criterion are mapped in **Figures A-2** through **A-15**, **Attachment 1**. For each criterion, resources that trigger unsuitability are identified. Please note that the resources identified are not exhaustive of that type of resource in the decision area; they are only those resources that overlie areas with coal potential identified under Screen 1 (**Figure A-1**), and that result in areas being identified as unsuitable. Acreages are not additive across the table because of overlapping resources (for example, wilderness study areas that drive unsuitability are also managed as visual resource management Class I and, therefore, subject to both criteria 5 and 6). **Figure A-15** shows the aggregate result of Screen 2.

Table A-1
Screen 2 Results

Criterion Number	Criterion Name / Applicable Resources in the Planning Area	Acres Unsuitable
Criterion 1 *Figure A-2*	*Federal Land System* • Lewis and Clark National Historic Trail System	14,940
Criterion 2 *Figure A-3*	*Federal Lands within Rights-of-Ways* • Rights of Way s	38,610
Criterion 3 *Figure A-4*	*Buffer Zones along Public Roads, Schools, and Parks* • Parks • Cemeteries • Schools • Public roadways • Dwellings	40,960
Criterion 4 *Figure A-5*	*Wilderness Study Areas (WSAs)* • Terry Badlands WSA	15,600

Criterion Number	Criterion Name / Applicable Resources in the Planning Area	Acres Unsuitable
Criterion 5 *Figure A-6*	*Scenic Areas* • Terry Badlands WSA	14,970
Criterion 6	*Scientific Study*	0
Criterion 7 *Figure A-7*	*Historic Lands and Sites* • Battlegrounds	800
Criterion 8	*Natural Areas*	0
Criterion 9 *Figure A-8*	*Federally Designated Critical Habitat for Threatened and Endangered Species* • Black-footed ferret (endangered) • Northern long-eared bat (threatened)	124,480
Criterion 10	*State-listed Threatened and Endangered Species*	0
Criterion 11	*Bald and Golden Eagle Nest Sites*	0
Criterion 12	*Bald and Golden Eagle Roost and Concentration Areas*	0
Criterion 13 *Figure A-9*	*Falcon Cliff Nesting Sites* • Prairie falcon and/or merlin	13,290
Criterion 14 *Figure A-10*	*Migratory Birds of High Federal Interest*	117,210
Criterion 15 *Figure A-11*	*Habitat for Species of High Interest to the State* • Big game crucial winter range (mule deer, white-tailed deer, and bighorn sheep) • High-priority fish habitat • Greater sage-grouse leks and habitat management areas (for example, priority habitat management areas) • Sharp-tailed grouse leks and buffer zones	1,165,830
Criterion 16 *Figure A-12*	*100-Year Floodplain*	4,710
Criterion 17 *Figure A-13*	*Municipal Watersheds*	9,770
Criterion 18	*National Resource Waters*	0
Criterion 19 *Figure A-14*	*Alluvial Valley Floors*	174,310
Criterion 20	*Tribal and State Proposed Criteria*	0

Stipulation for Criterion 15

Many of the species listed under criterion 15, Habitat for Species of High Interest to the State, have reclamation as a stipulated method of coal mining. This stipulation requires reclamation using an approved seed mix that is appropriate to the soil type(s) found within the disturbance area.

Stipulation

The holder shall seed all disturbed areas with the seed mix, as agreed upon by the BLM based on the soil type(s). There shall be no primary or secondary noxious weed seed in the seed mixture. Seed shall be tested, and the viability testing of seed shall be done in accordance with state law(s) and within 6 months prior to purchase. Commercial seed shall be either certified or registered seed. The seed mixture container shall be tagged in accordance with state law(s) and available for inspection by the BLM Authorized Officer.

A.3.3 Screen 3—Multiple Use

In addition to the areas unsuitable under Screen 2, land use decisions to protect resources of high value to the public may eliminate additional coal deposits from further consideration. The BLM reviewed other resource values and land uses not addressed under the 20 unsuitability criteria; additional lands were determined unacceptable for further consideration for leasing.

After close review of resources in the decision area, and in consultation with state and federal agencies, the BLM identified a number of resources that are eliminated from further consideration for coal leasing under Screen 3 in this SEIS/RMPA. Approximately 95,100 acres were determined unacceptable for further consideration for leasing in the 1985 Powder River RMP based on concerns for wildlife, soils, forest, recreation, agricultural, and watershed characteristics.

Table A-2 describes these resources. Under Alternative B, the BLM considered air and climate but did not remove any areas as unacceptable for further consideration for leasing. Therefore, **Table A-2** applies to Alternative B, with the exception of the air and climate consideration. All areas identified in **Table A-2** apply to Alternative C.

Table A-2
Screen 3 Results

Multiple-Use Screen	Acres Unacceptable for Further Consideration for Leasing
Cultural Viewsheds (Figure A-16)	99,050
Recreation Areas (Figure A-16)	8,770
Areas of Critical Environmental Concern (ACECs) (Figure A-16)	1,410
Oil and Gas Wells (Figure A-17) • 0.5-mile buffer on existing gas wells	55,500
Oil and Gas Units (Figure A-17) • All lands within an existing oil and gas units agreement	38,610
Perennial, Riparian, and Wetland Resources (Figure A-18) • 300-foot buffer on all perennial waterways • 10-foot buffer on all riparian and wetland aquatic habitat	1,430
Fishing Reservoirs (Figure A-18) • 0.25-mile buffer on all sport fish reservoirs located on BLM-administered lands	830
Conservation Easements (Figure A-18)	1,840
Air and Climate[1] *(Figure A-19)* • Excludes lands outside an 8-mile infrastructure area around existing mines	1,525,190

[1] The air and climate multiple-use screen was only applied to Alternative C.

Cultural Resources

The landscapes of two National Historic Landmarks (Rosebud Battlefield and Battle Butte) and two BLM-administered ACECs (Powder River ACEC and Reynold's Battlefield ACEC) would be adversely affected by the impacts of coal development activity on visual settings integral to those resources and their value to the public. The BLM developed viewshed analyses from these sites to identify potential conflicts.

Fluid Minerals

Coal development activities can damage oil and gas well integrity and oil and gas infrastructure around active wells where the two overlap. Oil and gas development and current oil and gas agreements merit buffers on coal leasing availability to prevent such conflicts. The recommended buffer distances, below, reflect the smallest area reliably needed to protect equipment, flow lines, and well integrity, based on an assumption that 1 square mile was the minimum amount of land to develop a coal mine. Buffers apply to all wells and units, regardless of ownership.

- 0.5-mile buffer from all active wells
- All lands within an existing oil and gas unit agreement

Wildlife

Potential conflicts between development of coal mineral resources and riparian areas, perennial streams, and sport fish reservoirs warrant their designation as unsuitable. These areas include:

- 300-foot buffer on all perennial waterways
- 10-foot buffer on all riparian and wetland aquatic habitat
- 0.25-mile buffer on all sport fish reservoirs located on BLM-administered lands

Air Resources

Alternative B considered air quality when completing the multiple-use screen for air resources; however, existing data and modeling done for the 2015 Proposed RMP/Final EIS showed no air quality standards were exceeded based on the national ambient air quality standards under the Clean Air Act. Therefore, no resulting geographic area of land was designated not suitable for further leasing of coal.

For the multiple-use coal screen, Alternative C applied an air resources multiple-use screen based on greenhouse gas emissions that would result from additional transportation to deliver coal to the existing infrastructure. The modified air screen limits coal development to an 8-mile infrastructure area around the four existing mines. The 8-mile area encompasses existing transportation infrastructure (for example, haul roads, conveyor belts, and railroad loops) associated with load-out facilities at the existing mines. This screen eliminates an additional 1,376,265 acres for the multiple-use screen compared with Alternative B (**Table A-2**).

A.3.4 Screen 4—Consultation with Qualified Surface Owners

The BLM sent letters to all identifiable surface owners with parcels overlying BLM-administered federal coal resources in areas where the USGS was evaluating the coal potential. These letters requested that the surface owners confirm they are qualified to express their preference on mining federal coal resources (see 43 CFR 3400.0-5(gg)(1) and (2)). The BLM also asked that the surface owners respond with their preference for or against mining by other than underground methods (i.e., surface mining) on the BLM-administered federal coal resources beneath their land. A sample of the letters sent to private surface owners can be found in **Attachment 2**.

In order to be a qualified surface owner in accordance with the regulations at 43 CFR 3400.0-5, the individual(s) must:

1. Hold legal or equitable title to the surface of split estate lands;
2. Have their principal place of residence on the land; personally conduct farming or ranching operations upon a farm or ranch unit to be affected by surface mining operations; or receive directly a significant portion of their income, if any, from such farming and ranching operations;
3. Have met the first two conditions for a period of at least 3 years, except for persons who gave written consent less than 3 years after they met the requirements. In computing the 3-year period, the BLM Authorized Officer shall include periods during which title was owned by a relative of such person by blood or marriage if, during such periods, the relative would have met the requirements of this section

On January 28, 2019, the BLM mailed 6,552 letters to landowners where the USGS was evaluating the coal potential. The BLM requested a response by March 4, 2019. In the letter, the BLM requested verification of landowner qualifications and an opinion on leasing federal coal beneath their surface (favor, against, and undecided); the BLM also inquired if they have previously provided consent for surface mining. The BLM included an addressed, postage-paid envelope to encourage response. Of the 6,552 letters mailed, the BLM MCFO received responses from 2,561 qualified landowners (39 percent response rate) postmarked by March 4, 2019.

As a result of the landowner responses, the BLM MCFO removed 489,619 acres from consideration for coal leasing (**Figure A-22**). Landowner response letters are included in the project record.

A.4 REFERENCE

BLM GIS. 2019. GIS data on file with the BLM's eGIS server, used for calculations or figures related to the coal development strategy. BLM, Miles City Field Office, Montana.

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Attachment 1

Figures

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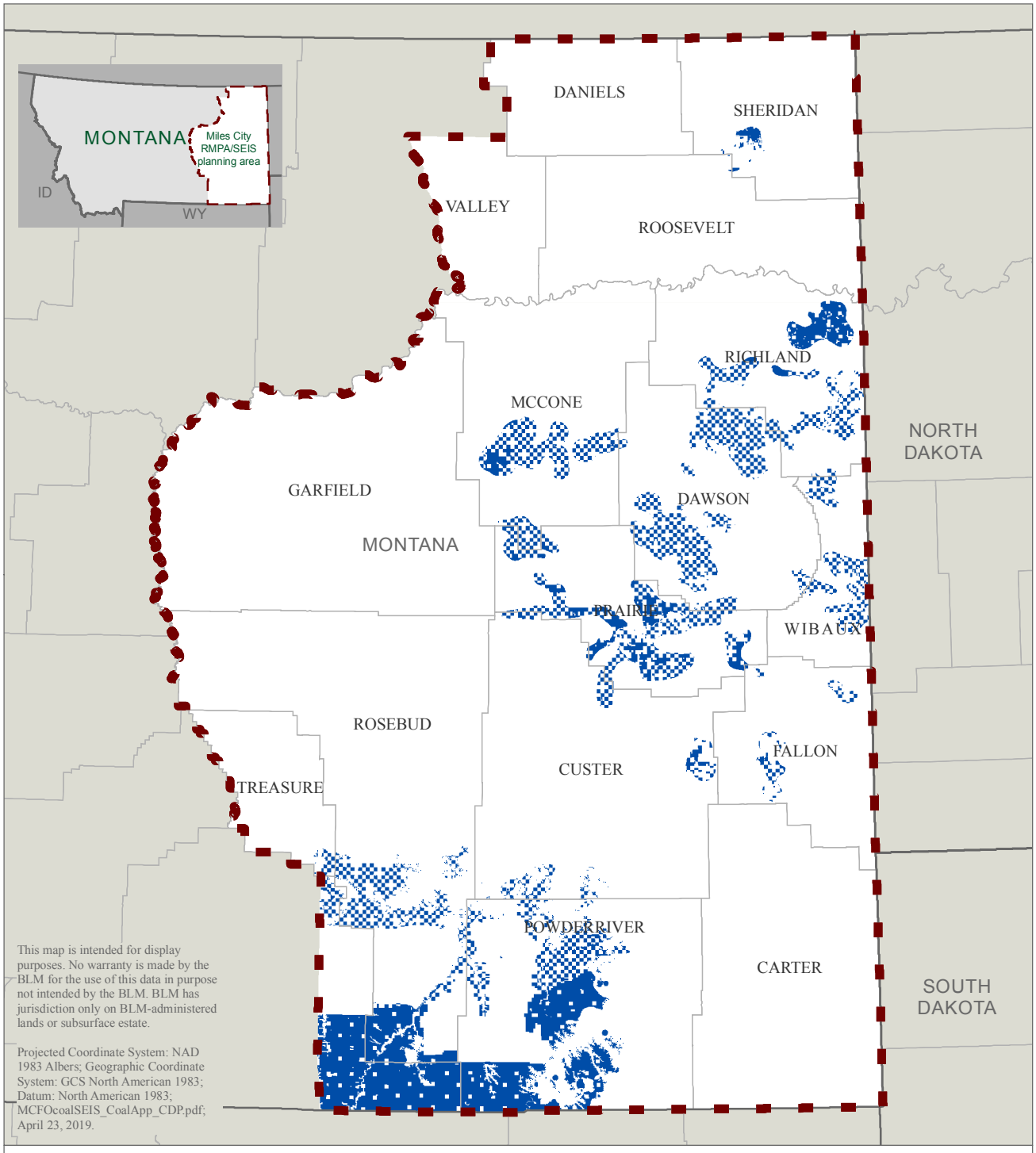

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MILES CITY FIELD OFFICE

Coal development potential

Subsurface federal mineral coal estate

1 inch = 39.3 miles

0 5 10 20 30 Miles

Figure A-1

Screen 1 Coal Development Potential

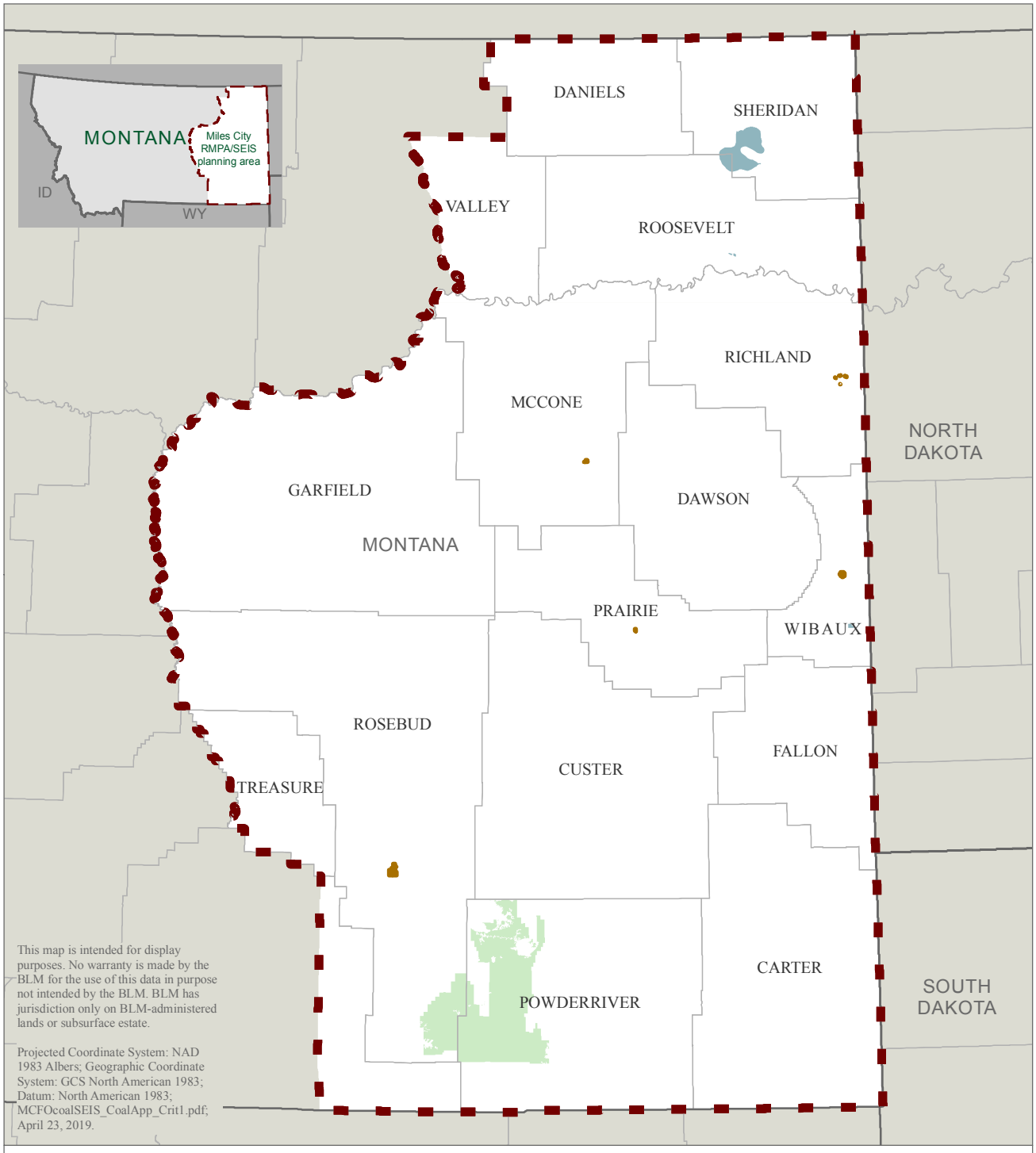


Figure A-2

Screen 2 Criterion 1 (Without Exception)—Federal Land System

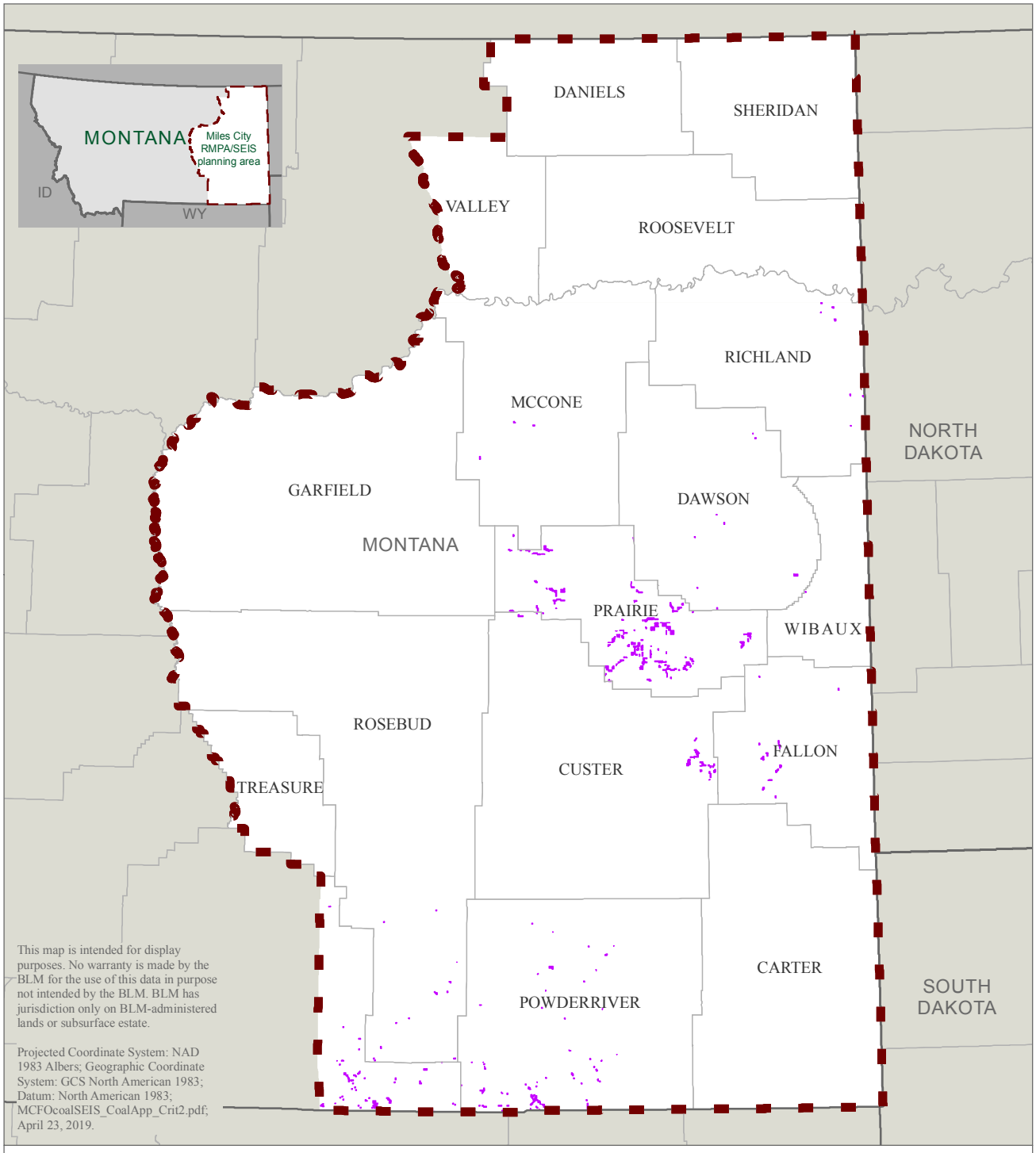


Figure A-3

Screen 2 Criterion 2 (With Exception)—Federal Lands within Rights-of-Ways

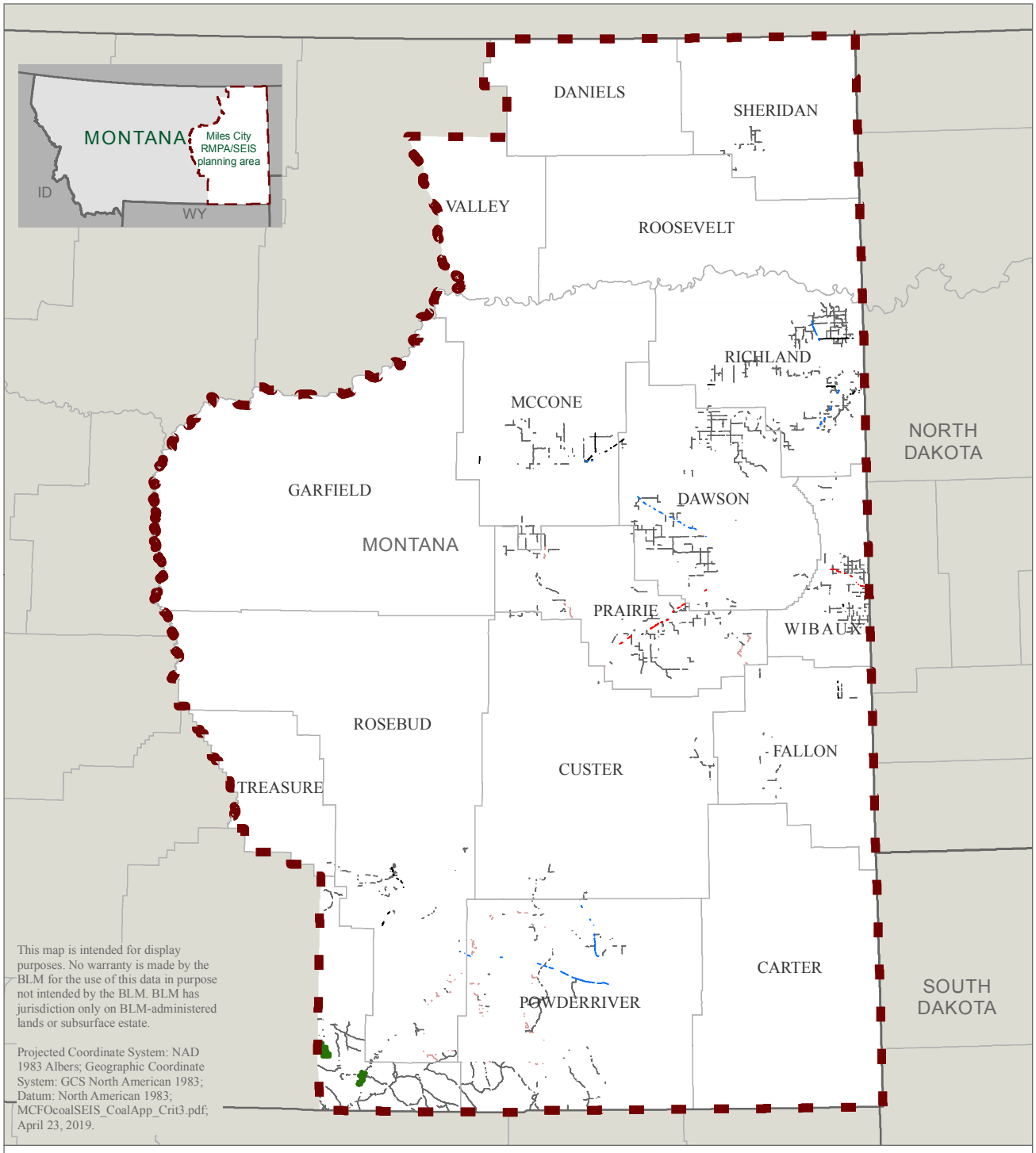


Figure A-4

Screen 2 Criterion 3 (With Exception)—Buffer Zones along Public Roads, Schools, and Parks

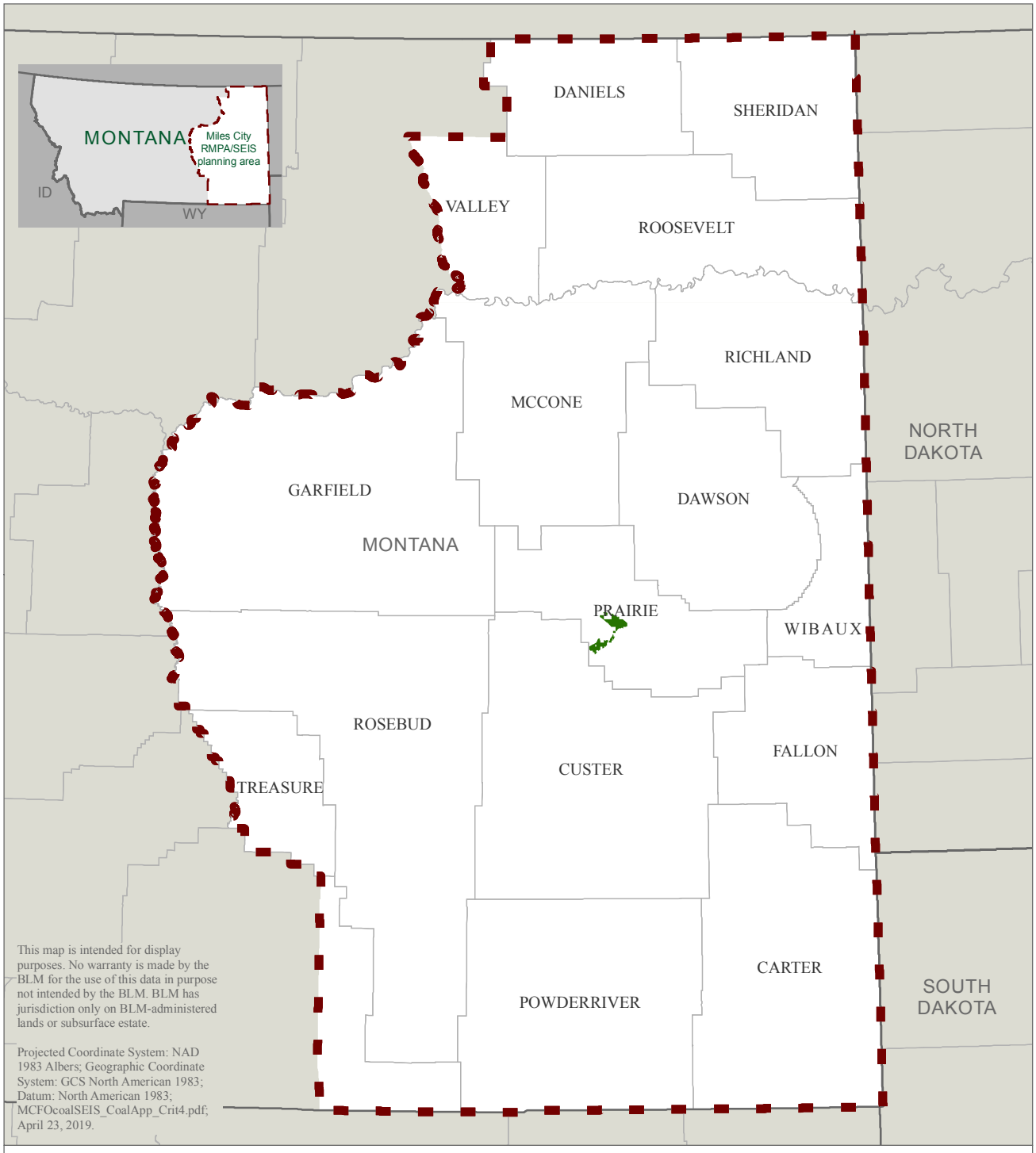


Figure A-5

Screen 2 Criterion 4 (Without Exception)—Wilderness Study Areas

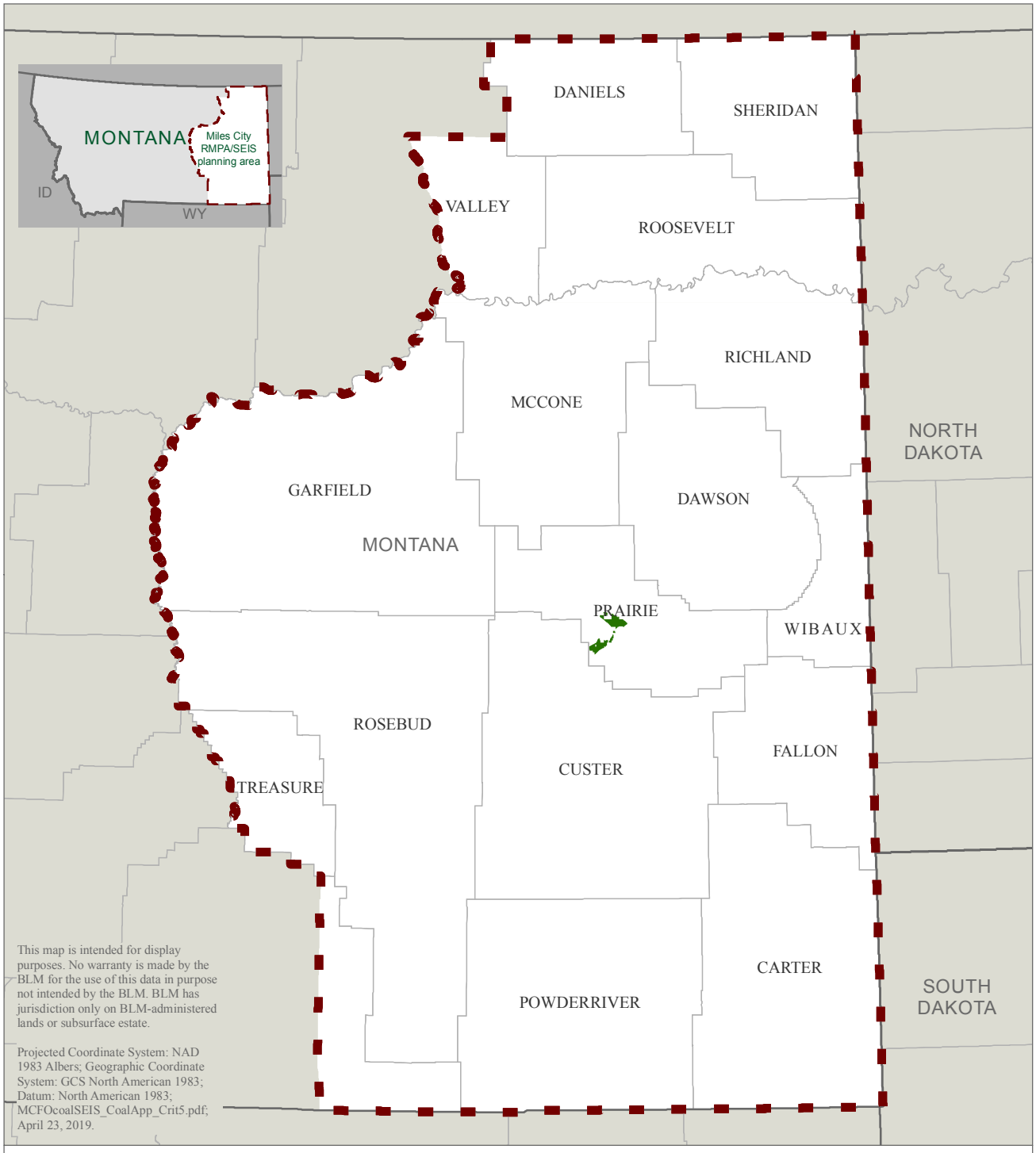


Figure A-6

Screen 2 Criterion 5 (With Exception)—Scenic Areas

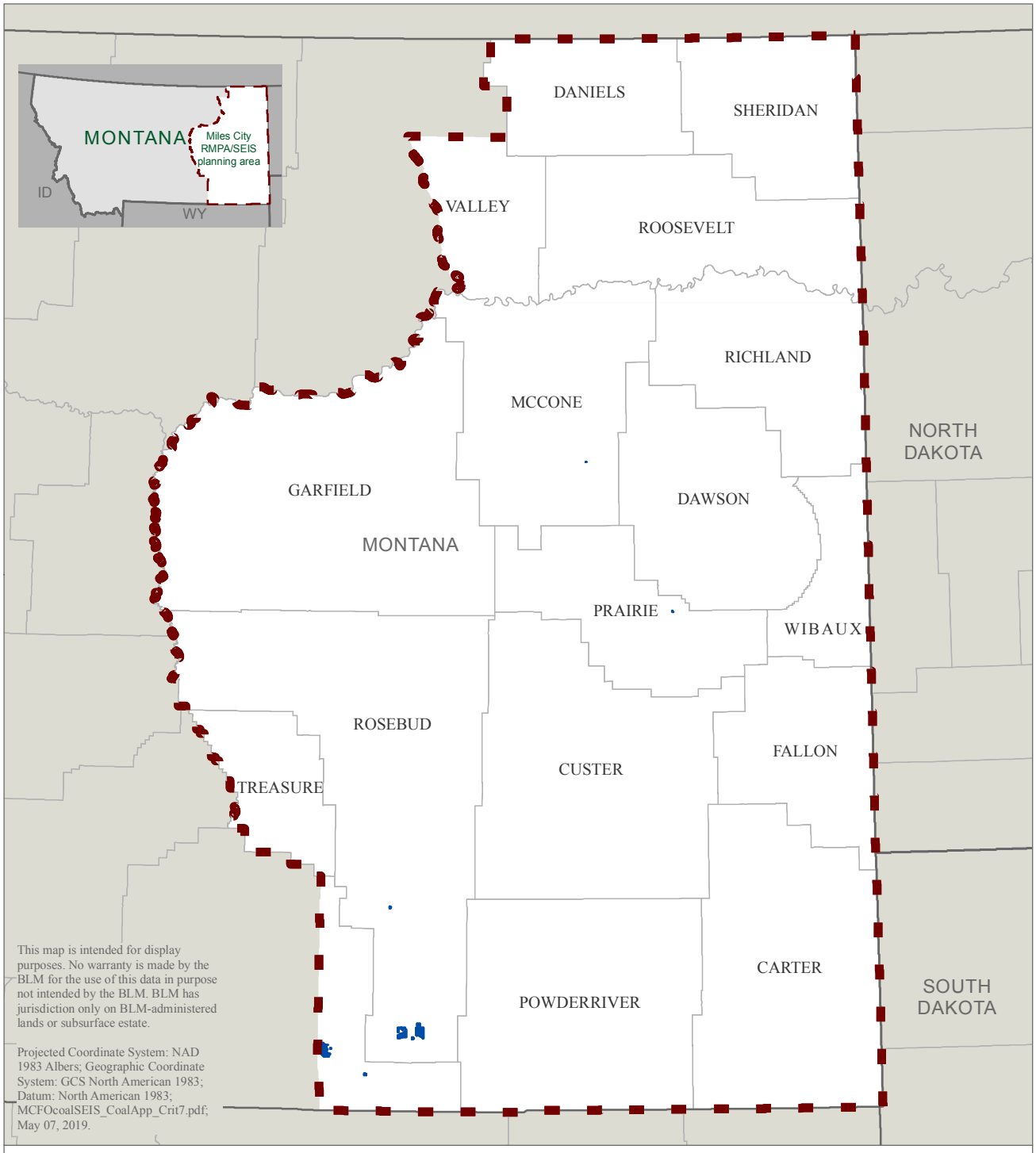


Figure A-7

Screen 2 Criterion 7 (With Exception)—Historic Lands and Sites

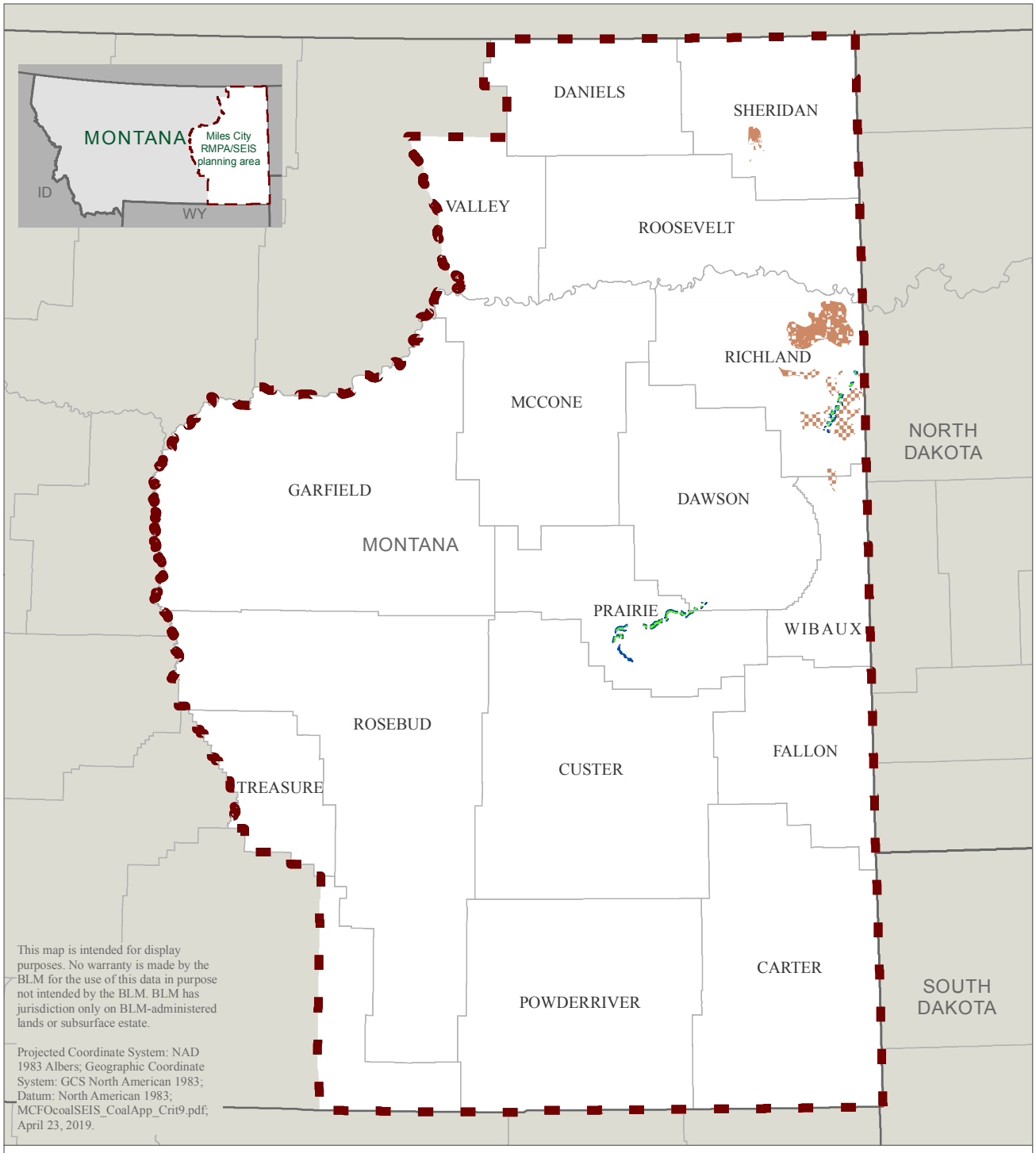


Figure A-8

Screen 2 Criterion 9 (With Exception)—Federally Designated Critical Habitat for Threatened and Endangered Species

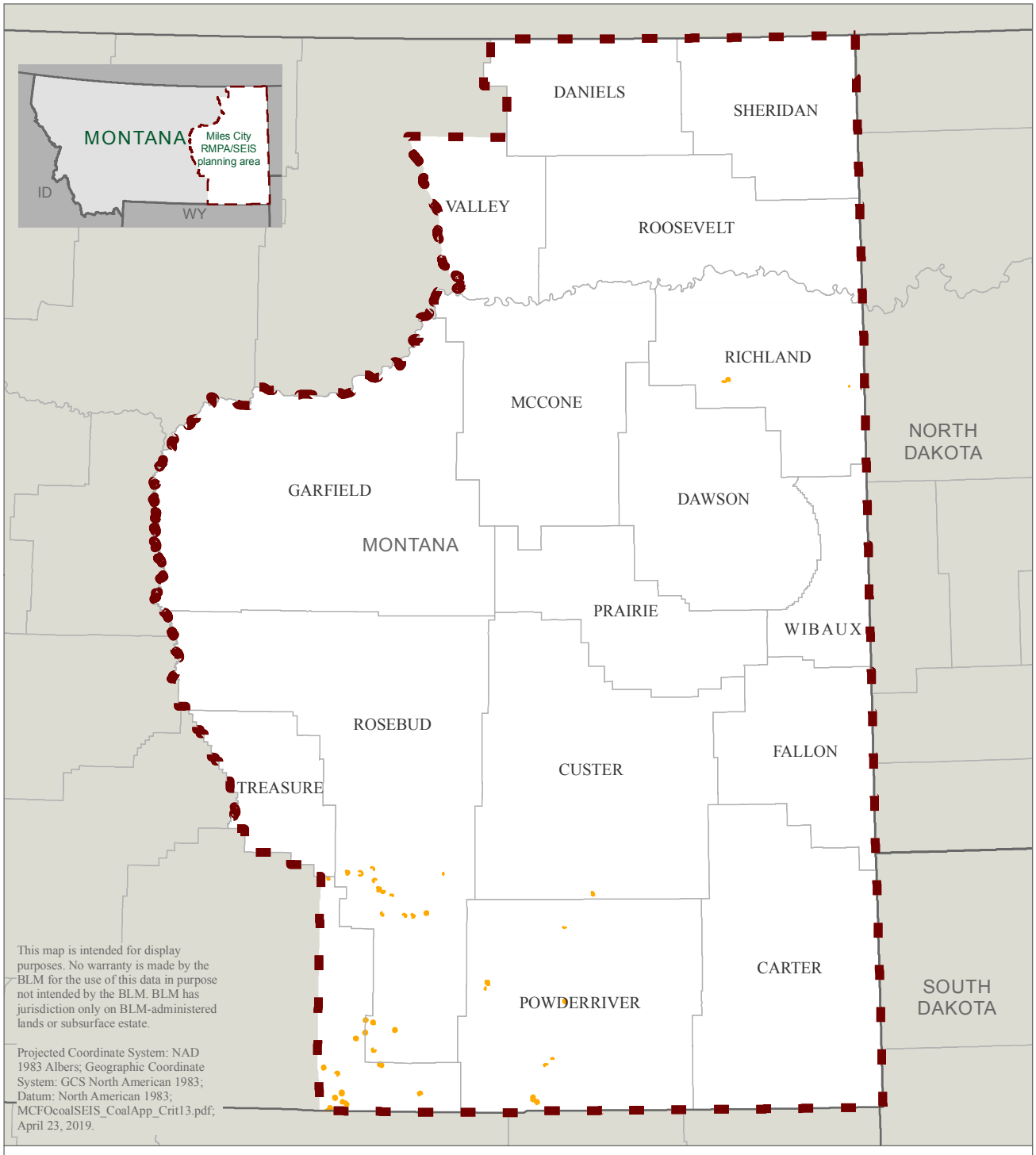


Figure A-9

Screen 2 Criterion 13 (With Exception)—Falcon Nesting Sites

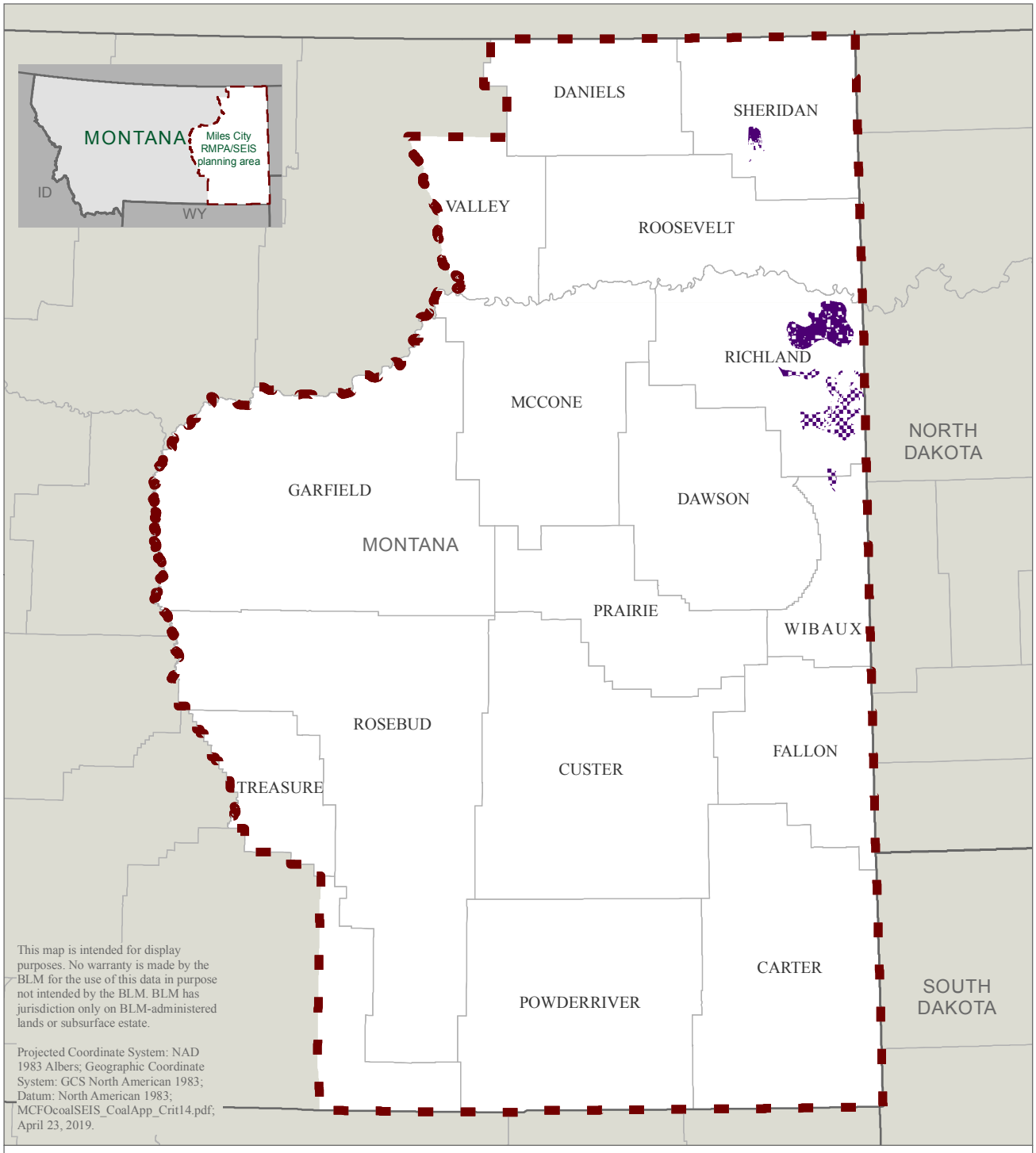
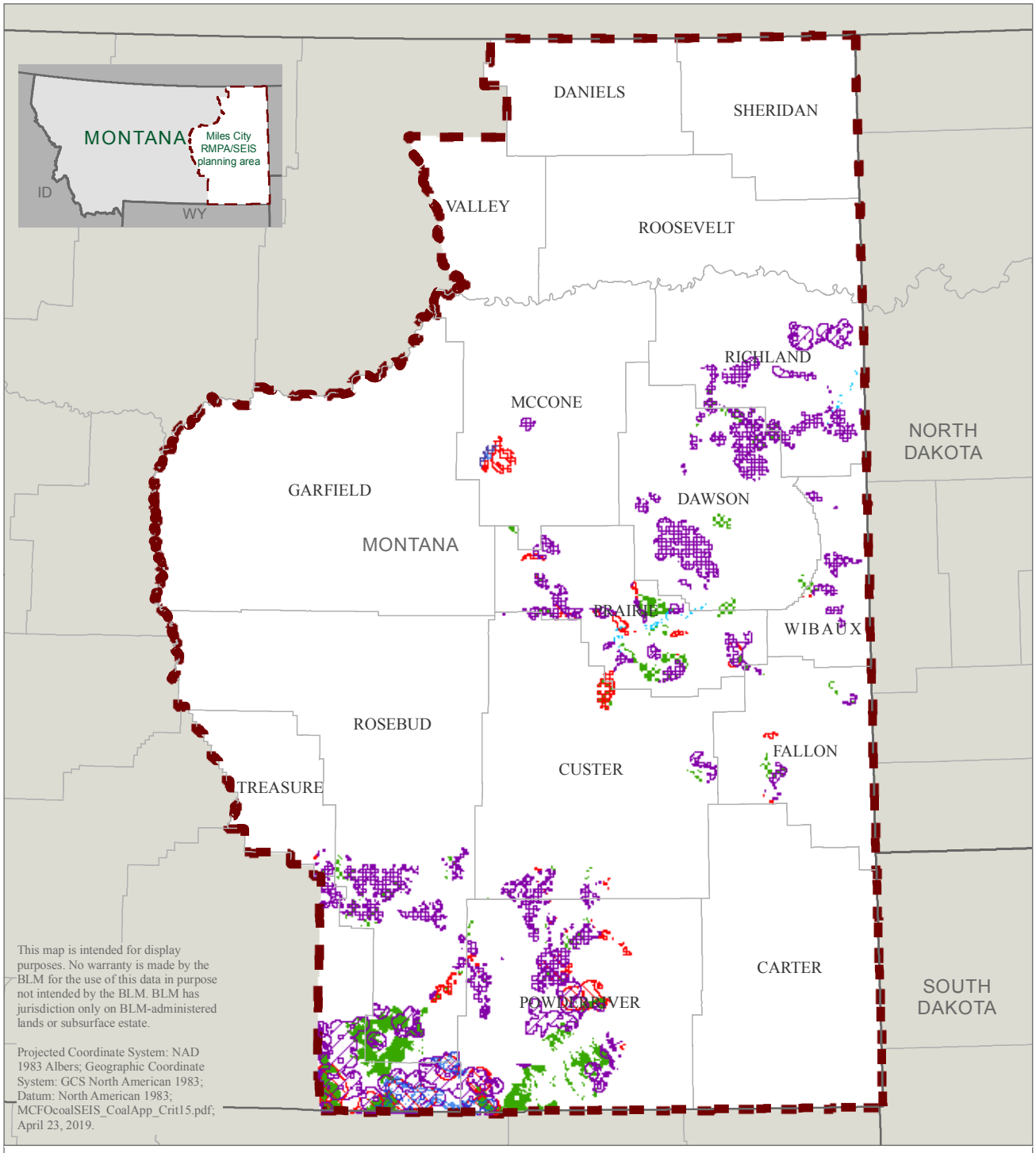


Figure A-10

Screen 2 Criterion 14 (With Exception)—Migratory Birds of High Federal Interest



UNITED STATES DEPARTMENT OF THE INTERIOR
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MILES CITY FIELD OFFICE

Sharp-tailed grouse leks
Greater sage-grouse leks
Greater sage-grouse priority habitat management area
High priority fish species habitat
Big game crucial winter range

1 inch = 39.3 miles

0 5 10 20 30 Miles

Figure A-11

Screen 2 Criterion 15 (With Exception)—Habitat for Species of High Interest to the State

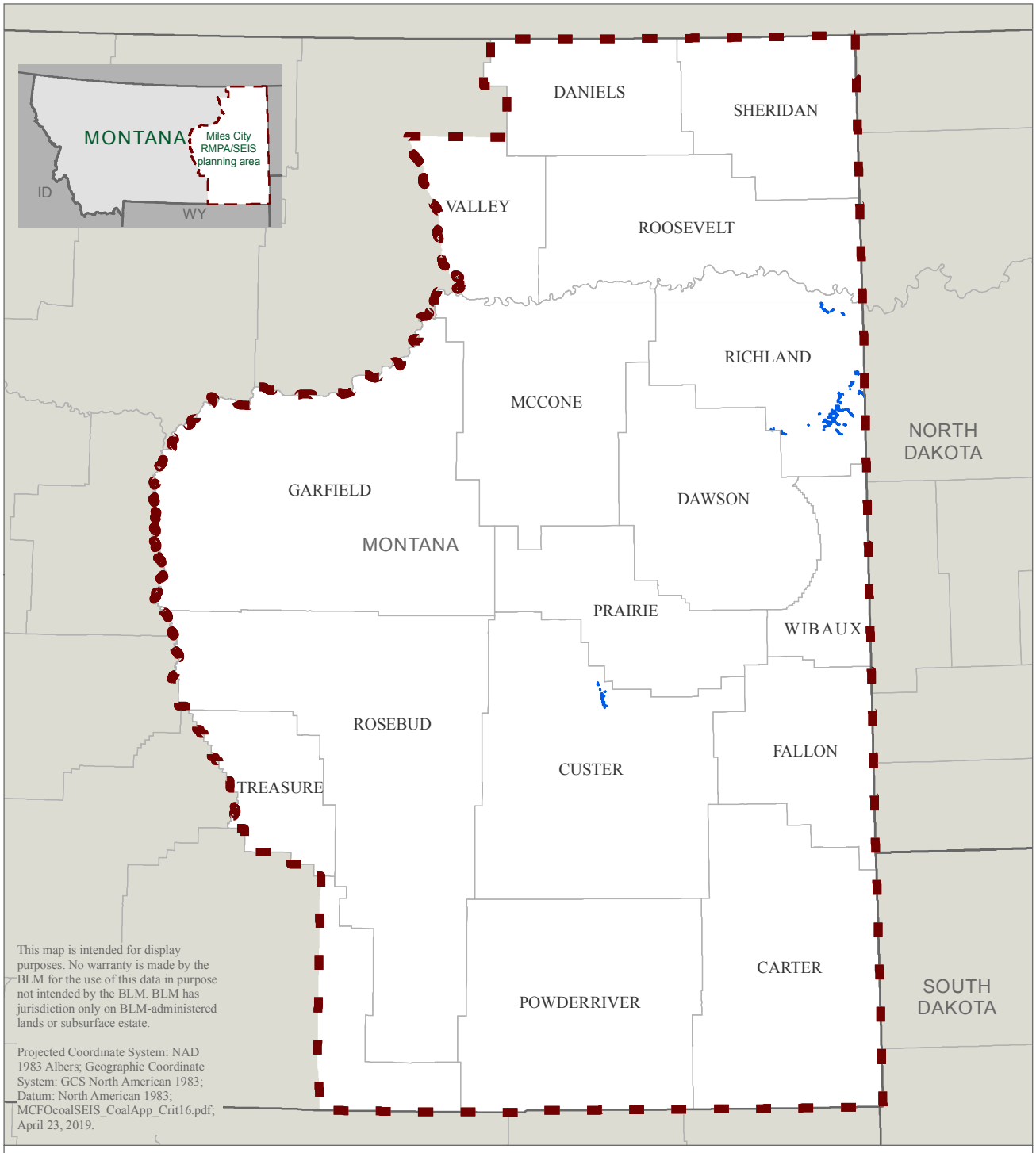


Figure A-12

Screen 2 Criterion 16 (Without Exception)—100-Year Floodplain

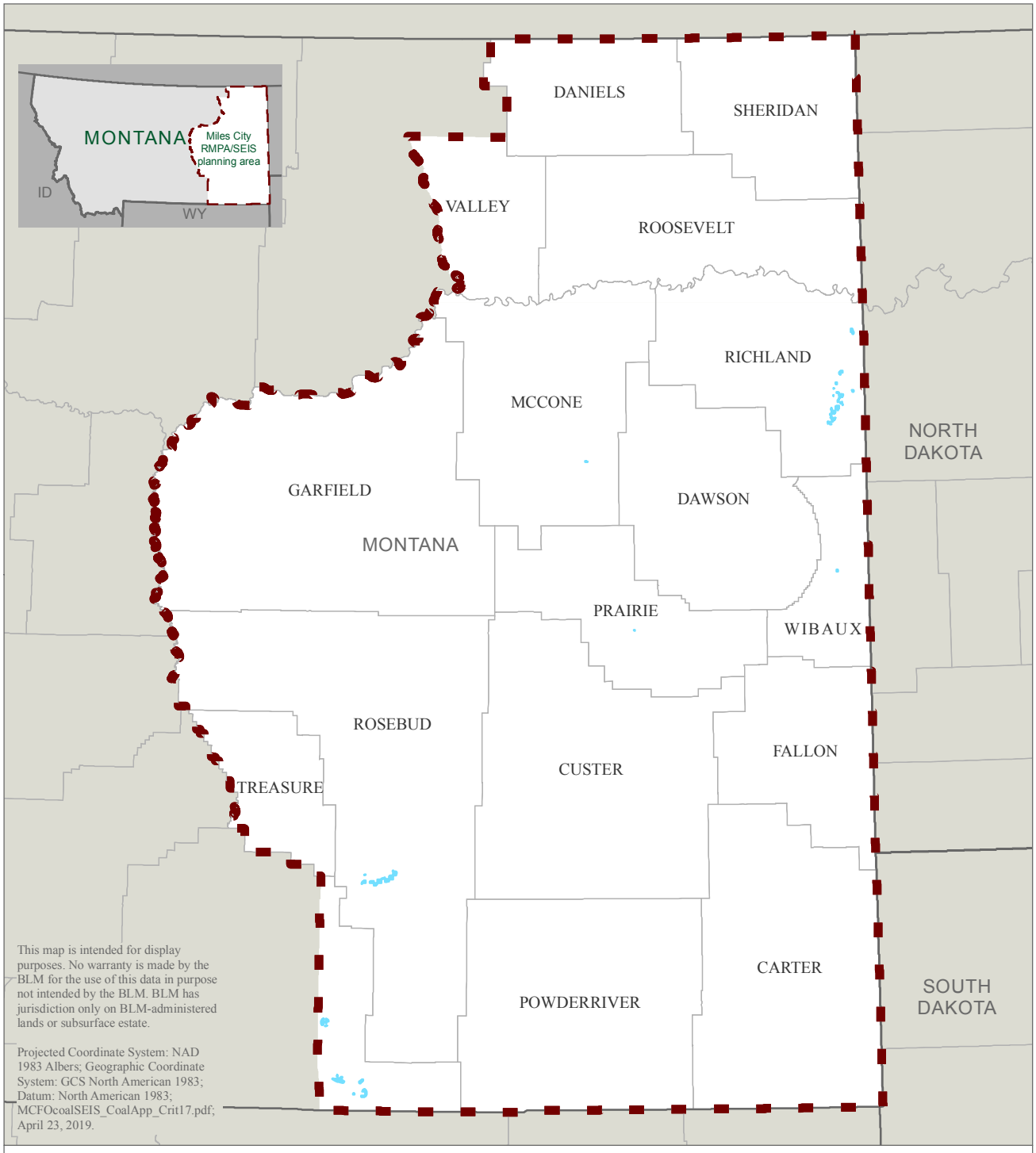


Figure A-13

Screen 2 Criterion 17 (With Exception)—Municipal Watersheds

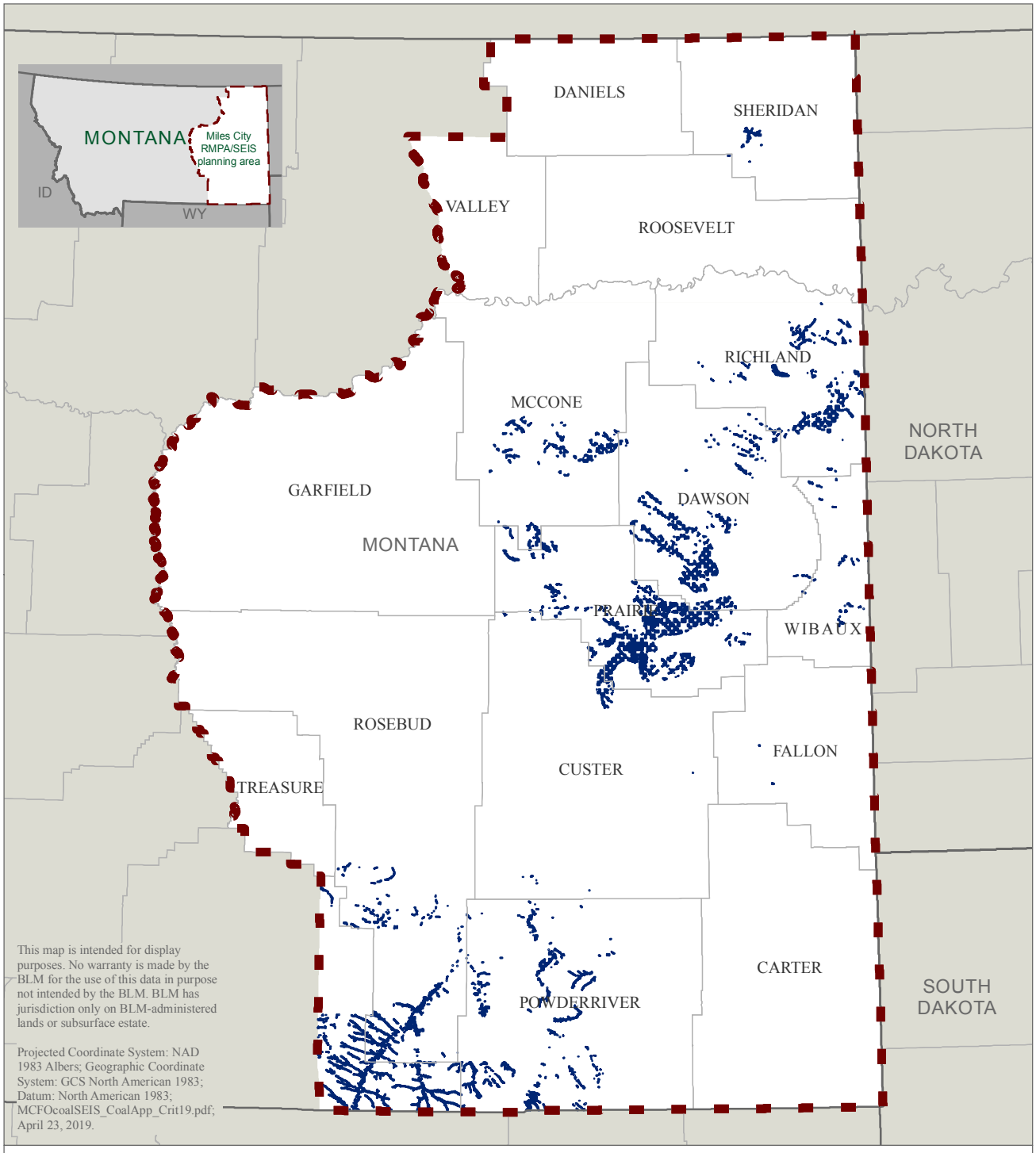


Figure A-14

Screen 2 Criterion 19 (Without Exception)—Alluvial Valley Floors

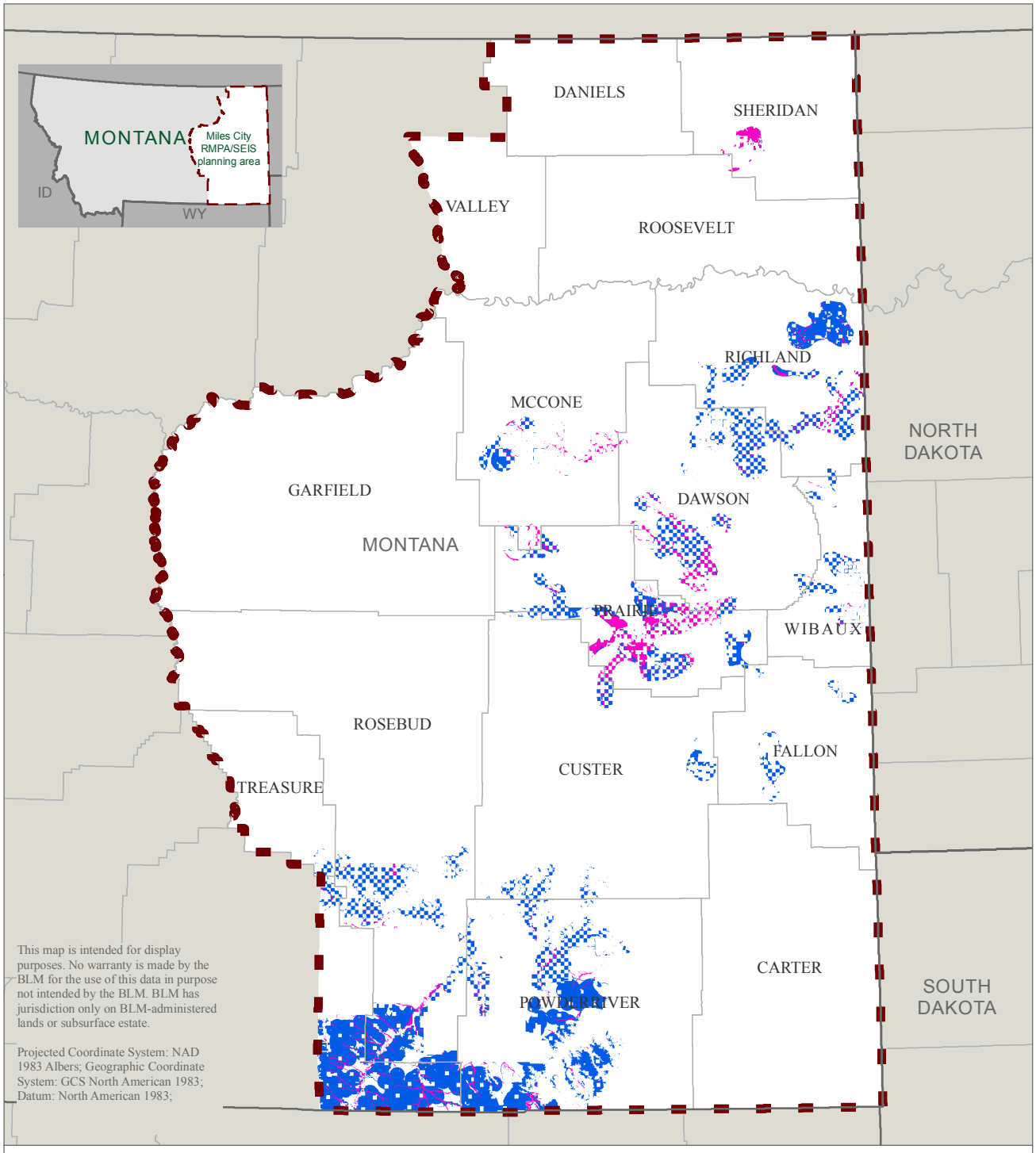


Figure A-15

Screen 2 (Unsuitable for all or Certain Stipulated Methods of Coal Mining)

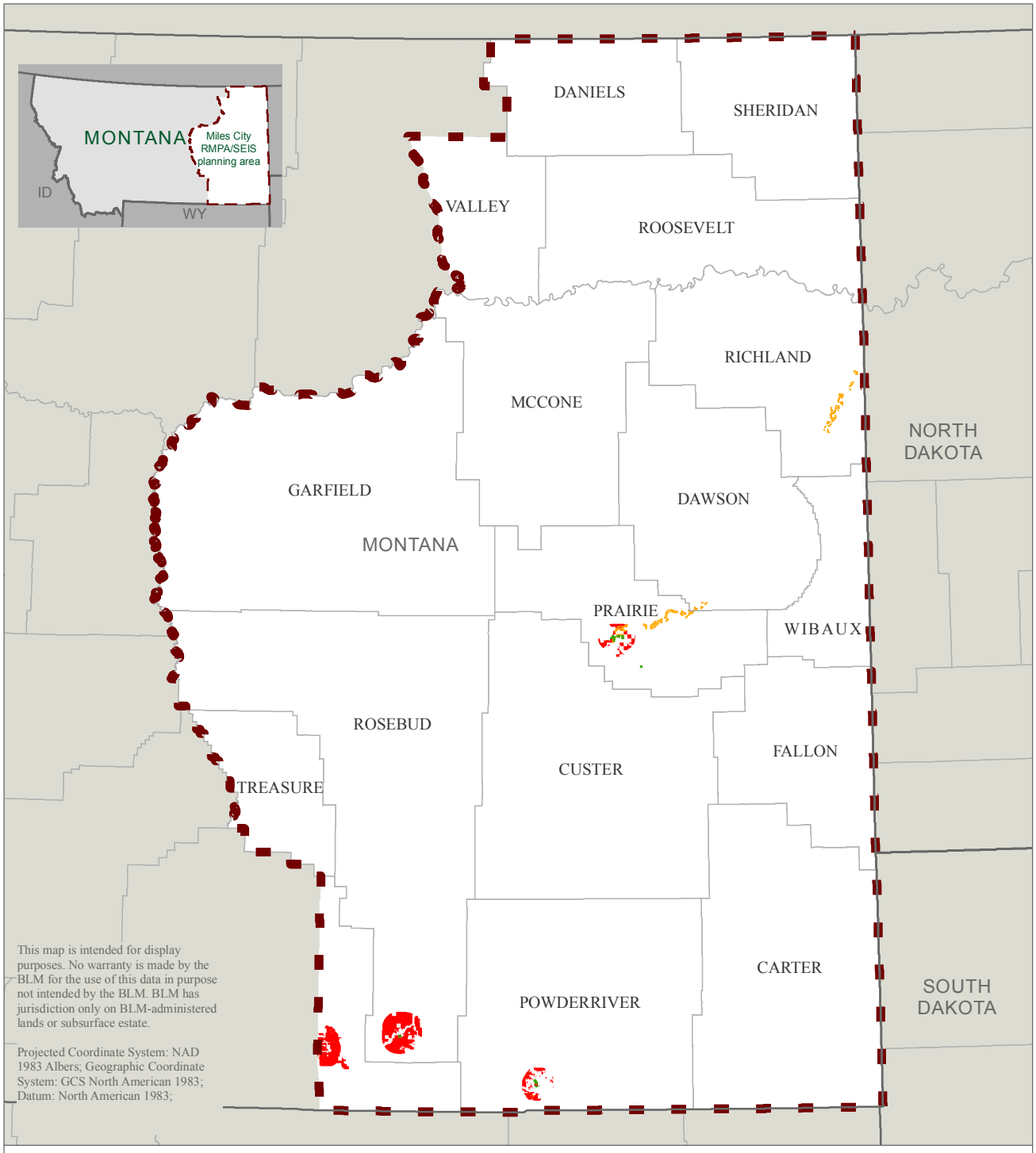


Figure A-16

Screen 3 Multiple-Use Decision—Cultural Viewshed, Recreation Areas, and ACECs (Alternatives B and C)

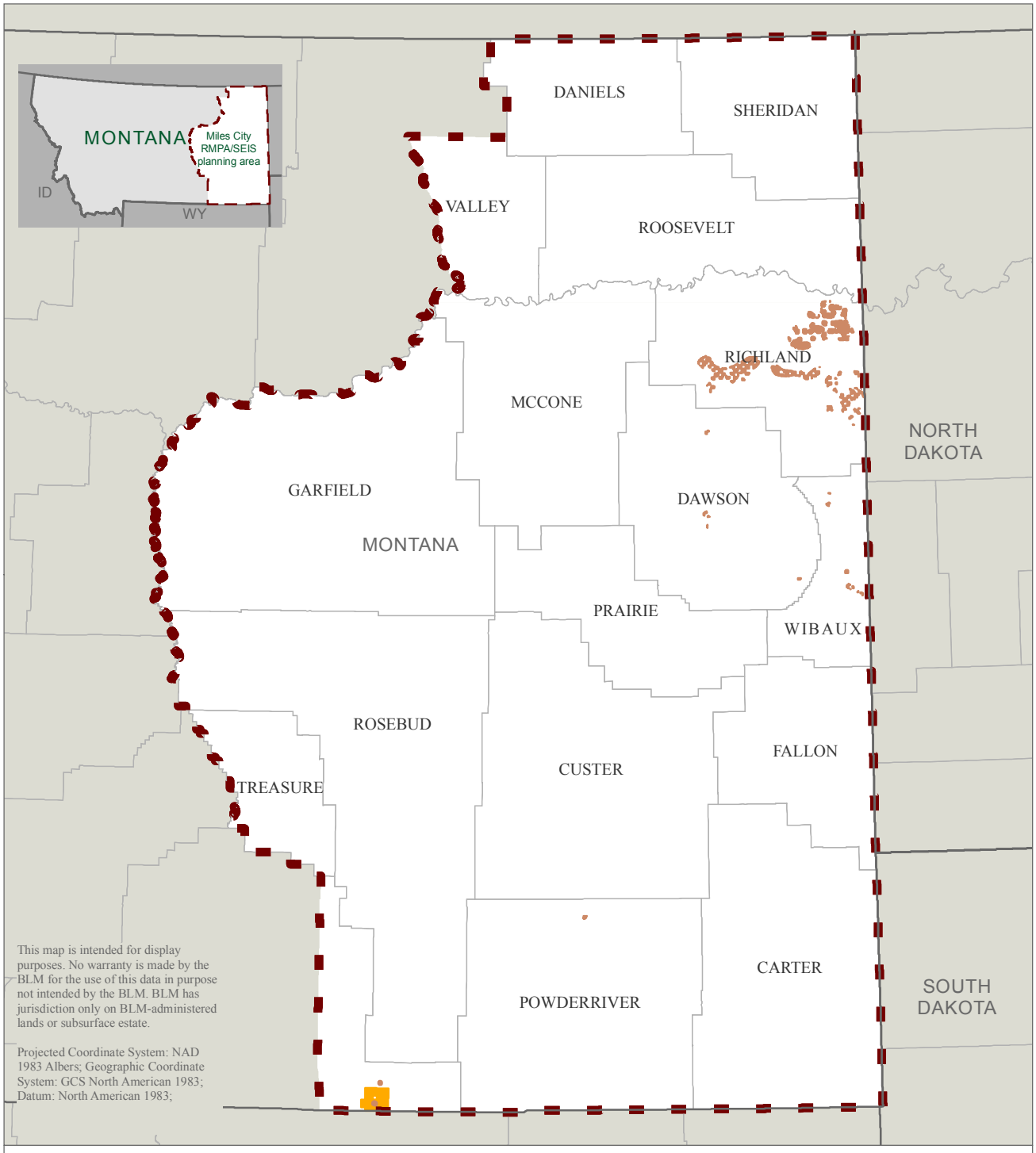


Figure A-17

Screen 3 Multiple-Use Decision—Oil and Gas (Alternatives B and C)

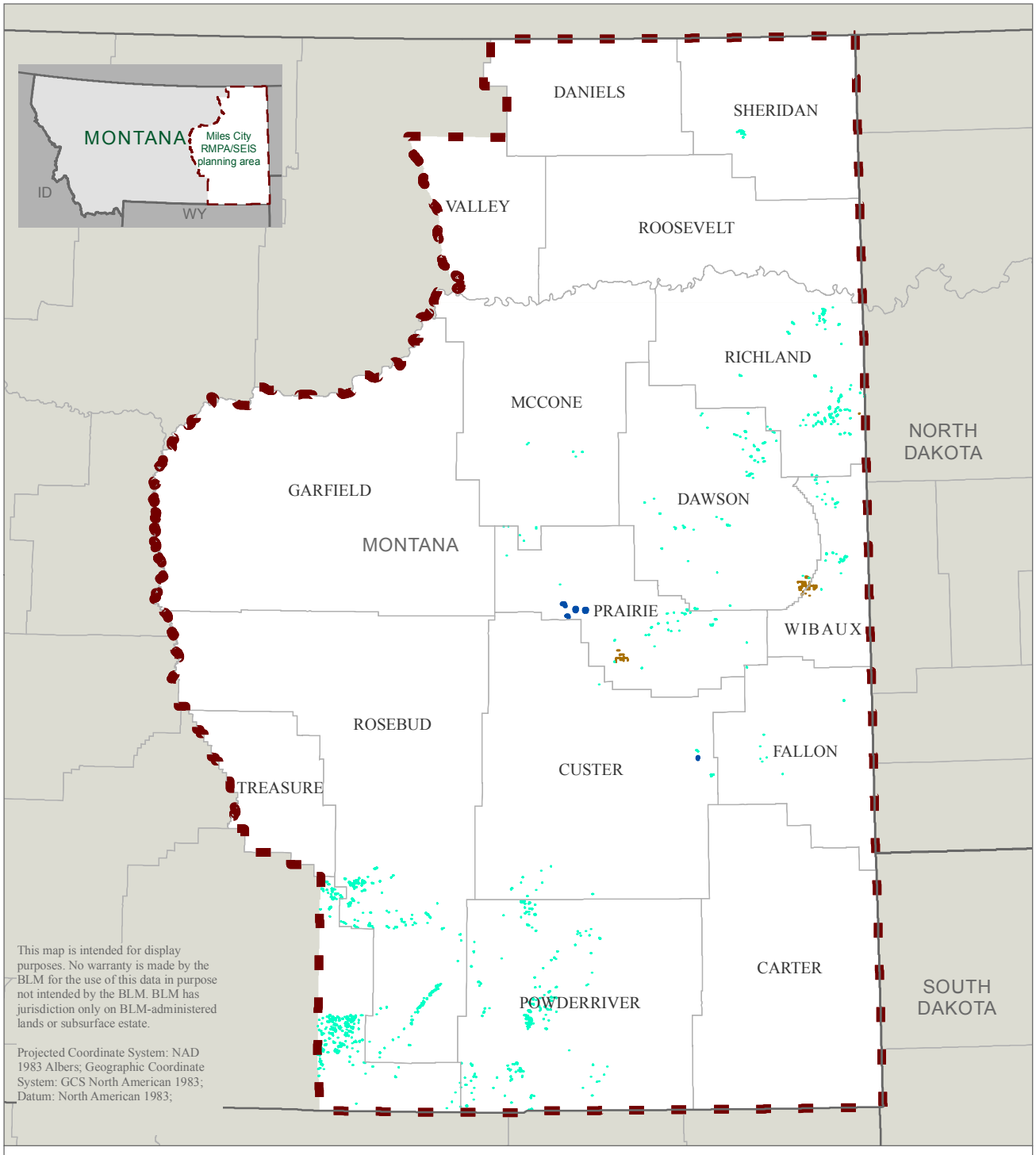


Figure A-18

Screen 3 Multiple-Use Decision—Biological Resources (Alternatives B and C)

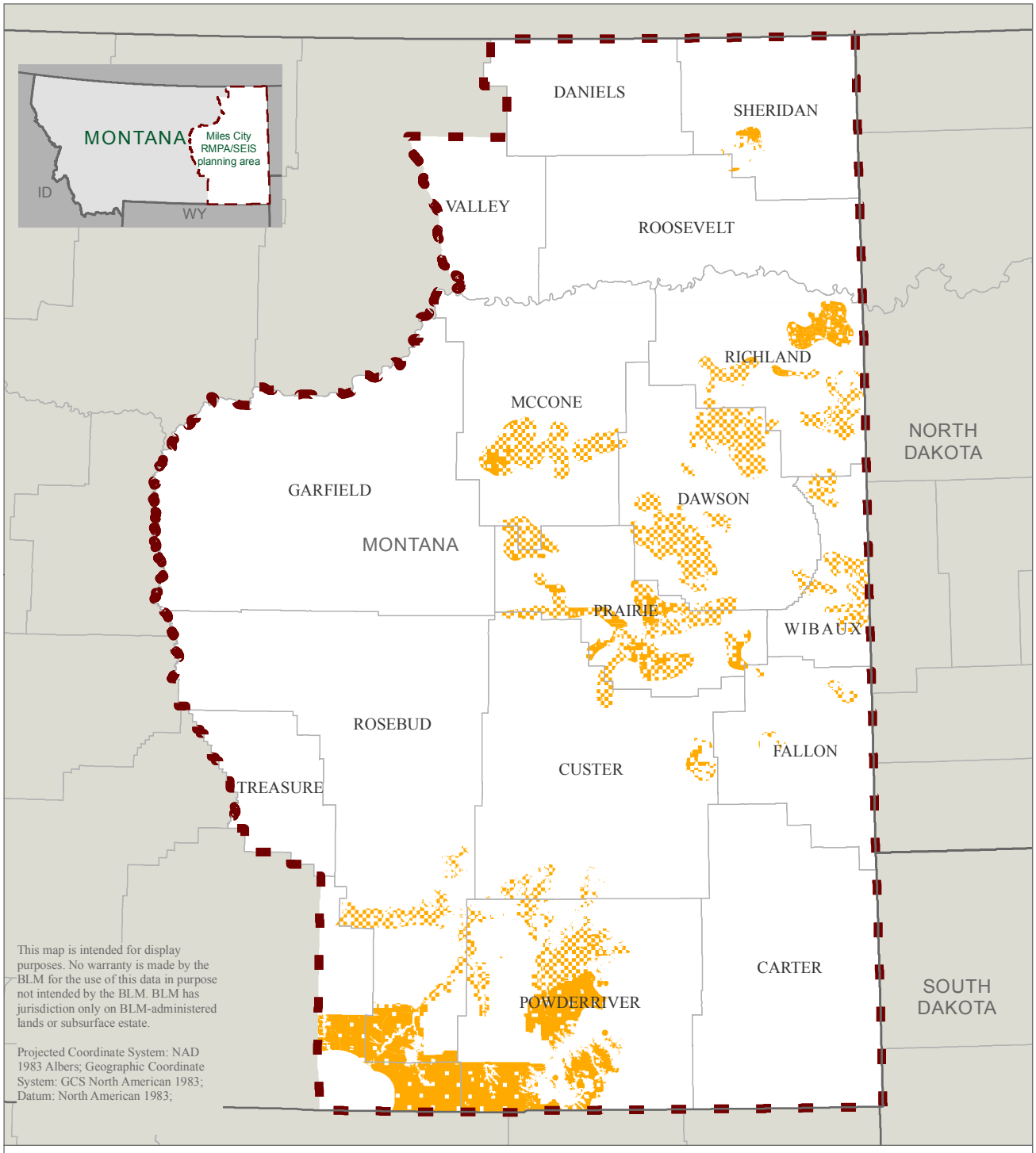
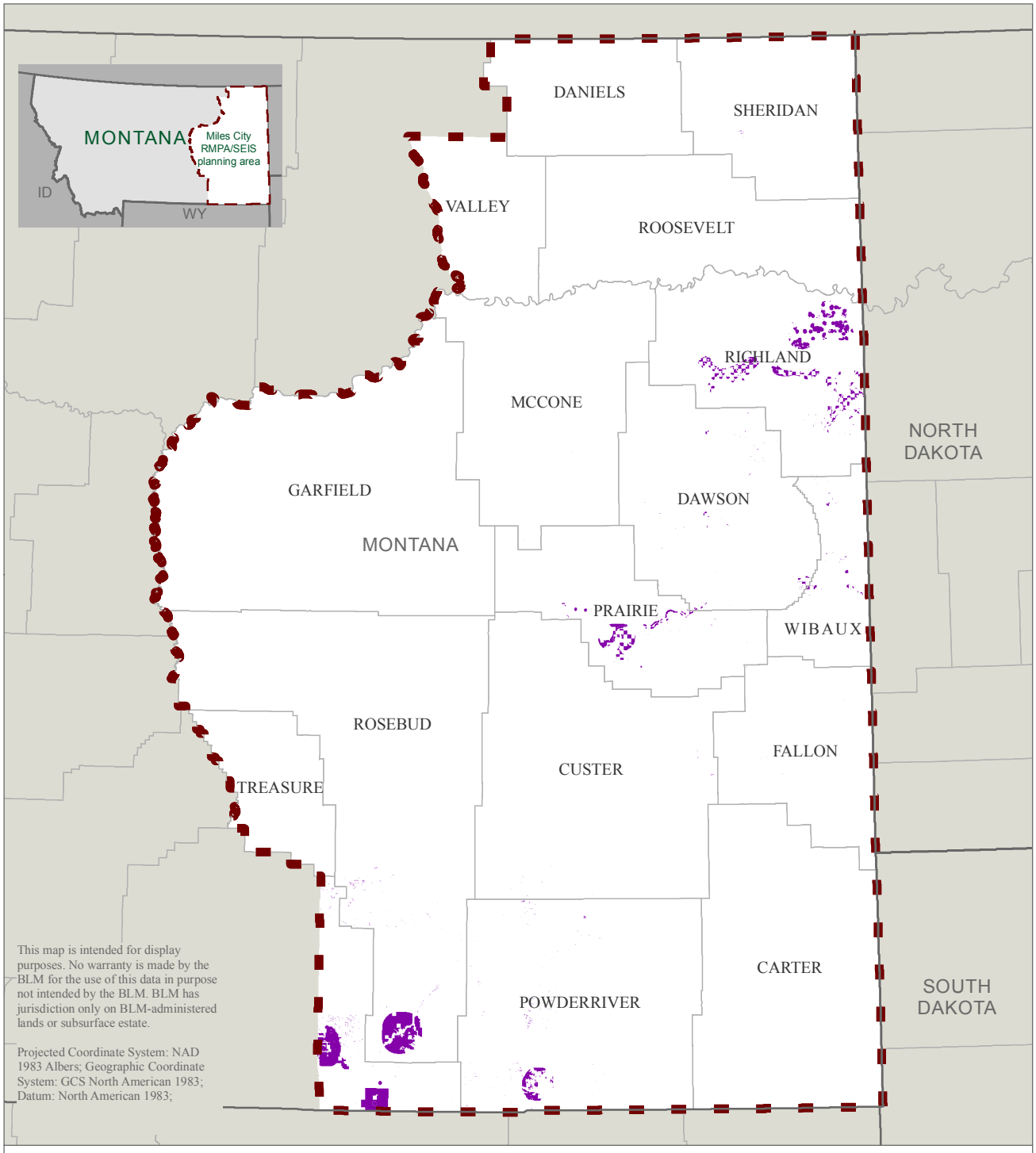


Figure A-19

Screen 3 Multiple-Use Decision—Air and Climate (Alternative C)



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MILES CITY FIELD OFFICE

Unavailable for leasing

1 inch = 39.3 miles

0 5 10 20 30 Miles

Figure A-20

Alternative B Screen 3 (Multiple-Use)

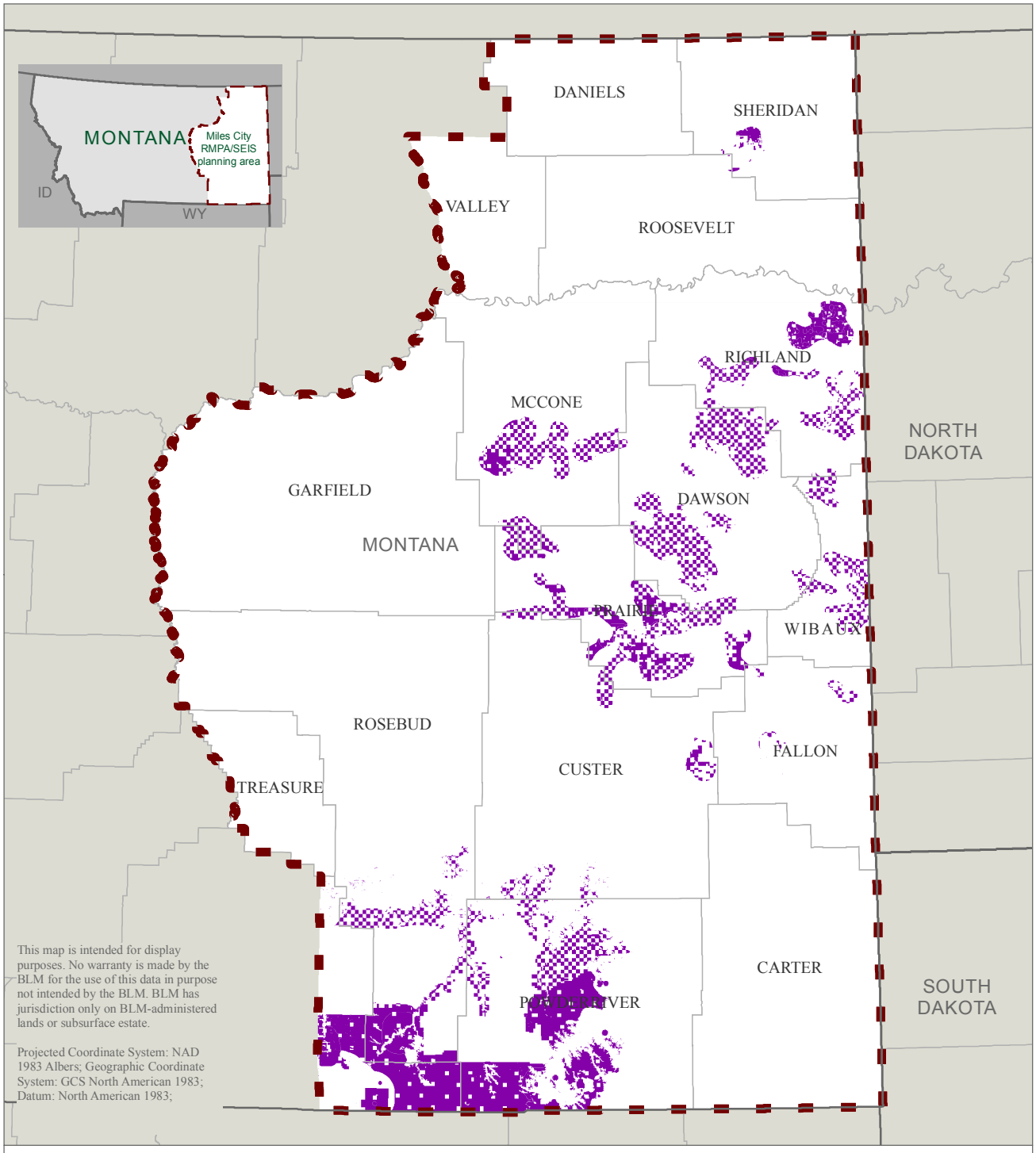
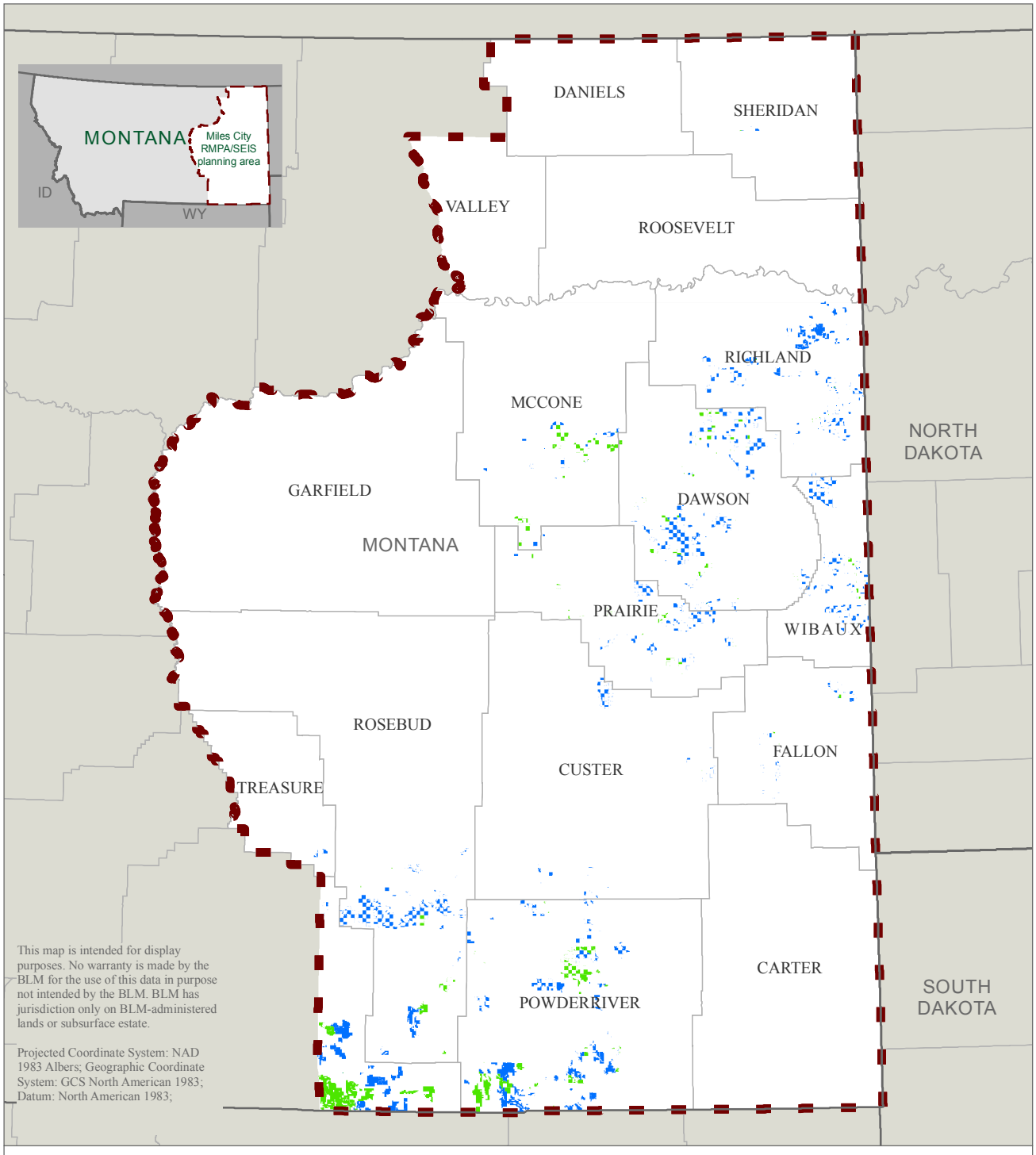


Figure A-21

Alternative C Screen 3 (Multiple-Use)



UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MILES CITY FIELD OFFICE

In favor (acceptable for further consideration for coal leasing)

Not in favor (unacceptable for further consideration for coal leasing)

1 inch = 39.3 miles

0 5 10 20 30 Miles

Figure A-22

Screen 4 Consultation with Qualified Surface Owners

Attachment 2

Sample Private Landowner Letter

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Eastern Montana-Dakotas District Office
111 Garryowen Road
Miles City, Montana 59301-7000
www.blm.gov/montana-dakotas

In Reply Refer To:
3420 (MTC0200)

January 30, 2019

FREE COPY

RE: Surface Owner Consultation Coal Screen – Amendment to the Approved Resource Management Plan for the Miles City Field Office, Montana, and Supplemental Environmental Impact Statement

Dear Surface Owner:

On November 28, 2018, the Bureau of Land Management (BLM) published a Notice of Intent (NOI) for a potential amendment to the Approved Resource Management Plan (RMP) for the Miles City Field Office and to prepare an associated Supplemental Environmental Impact Statement (SEIS). This potential amendment and associated SEIS is in response to a United States Montana District Court opinion and order (Western Organization of Resource Councils, et al vs BLM; CV 16-21-GF-BMM; 3/23/2018 and 7/31/2018).

In response to the order, the BLM is re-evaluating the four coal screens in accordance with 43 CFR 3420.1-4(e). The coal screens include: identification of coal development potential, 20 unsuitability criteria, multiple use conflicts, and surface owner consultation. The BLM has identified your private lands, which overlie federal coal deposits, as lands determined to have potential for coal development. The BLM has identified the legal land descriptions of these lands on Enclosure 1 for your review.

In accordance with 43 CFR 3420.1-4(e)(4)(i), BLM requests you notify the Miles City Field Office in writing by **March 4, 2019** on the following information:

1. If you are a qualified surface owner in accordance with 43 CFR 3400.0-5(gg) for the lands identified on Enclosure 1.
2. Your preference for or against mining by other than underground mining techniques on the lands identified on Enclosure 1.
3. Any additional information on the lands identified on Enclosure 1.

To facilitate this request, the BLM has enclosed a template document, Enclosure 1, with the appropriate information being requested. Feel free to use Enclosure 1 to notify the Miles City Field Office on the points listed above, and return it by using the enclosed envelope by **March 4, 2019**.

Any views provided through this request may be used in the completion of the SEIS and may be available for public review. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold, from public view, your personal identifying information, we

cannot guarantee that we will be able to do so. All submissions from organizations, from businesses, and from individuals identifying themselves as representatives of organizations or businesses, will be available for public review.

Because this is a planning document, lands considered under this SEIS would be analyzed to determine if they are acceptable for further considerations for coal leasing or unacceptable for further considerations for coal leasing. Leasing decisions would be considered under separate NEPA reviews when an application for leasing is submitted to the BLM. Therefore, the BLM would not be making leasing decisions at this time.

After review of the surface owner consultation responses, the SEIS will be prepared. BLM plans to have the SEIS available for public comment in spring 2019. The SEIS will be posted on the BLM e-Planning website, https:eplanning.blm.gov; where the project webpage can be found by conducting a land use plan text search for project DOI-BLM-MT-C020-2019-0004-RMP-EIS. Updated information, and associated documents, are also posted on the e-Planning project website.

We look forward to hearing from you on this project. If you have any questions, please contact Irma Nansel, Planning and Environmental Coordinator, at (406) 233-3653.

Sincerely,

Diane M. Friez
District Manager

Enclosure 1 - Template Document for Surface Owner Consultation

MTC0200:INansel:Hudson:1/30/19:Inansel_SurfaceOwnerConsultation_SEIS_Ltr_FY19

Enclosure 1.

Please returned to the Miles City Field Office by January 30, 2019.

Please Check One:

___ I am authorized to express my views as a qualified surface owner in accordance with 43 CFR 3400.0-5(gg), having met the following requirements for at least the past three years (or less if I have given written consent); I hold legal or equitable title of this land surface. I have my principal residence on this land, or I personally farm or ranch on this land, or I receive a significant portion of my income from farm or ranch operations on this land. I have met the requirements since _____.

___ I do not meet the requirements for a qualified surface owner in accordance with 43 CFR 3400.0-5(gg). Please explain below.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold, from public view, your personal identifying information, we cannot guarantee that we will be able to do so. All submissions from organizations, from businesses, and from individuals identifying themselves as representatives of organizations or businesses, will be available for public review.

Please identify your view(s) on leasing as listed below by aliquot or group of land description also listed below. Multiple views can be identified by aliquot or group land description(s). Provide additional information on the reserve side.

1. I am in favor of leasing of federal coal on these lands.
2. I am against leasing of federal coal on these lands.
3. I am undecided whether I favor or oppose federal coal leasing on these lands.
4. I have already given written consent for surface mining of federal coal on these lands.

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Appendix B

Air Resources Technical Support Report

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APPENDIX B
AIR RESOURCES TECHNICAL SUPPORT REPORT

This report provides additional details on the greenhouse gas (GHG) emissions estimates completed for the air resources analysis included in **Chapter 3** of the Supplemental Environmental Impact Statement (SEIS)/Resource Management Plan Amendment (RMPA) for the MCFO. **Tables 3-3** through **3-6** in **Section 3.3** of the SEIS/RMPA summarize total GHG emissions in units of carbon dioxide equivalents (CO_2e) from federal coal, federal oil, federal natural gas, and federal coalbed natural gas, respectively.

This appendix details GHG emissions by pollutant. **Tables B-1** through **B-4** show the GHG emissions from federal coal, federal oil, federal natural gas, and federal coalbed natural gas, respectively, for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which are the primary compounds that contribute to GHG emissions in the Miles City Field Office. **Table B-1** presents the CO_2, CH_4, and N_2O emissions from federal coal production, transportation, downstream combustion of federal coal, and compound totals. **Tables B-2** through **B-4** present the CO_2, CH_4, and N_2O emissions from oil and gas production and downstream combustion of federal oil and gas.

Oil and gas transportation emissions are assessed qualitatively in **Section 3.3** of the SEIS/RMPA. **Section 3.3** discusses the emission factors and methods used in the calculations; the data are available in the administrative record for the SEIS/RMPA.

Table B-1
CO_2, CH_4, and N_2O Emissions from Federal Coal Production, Transportation, and Downstream Combustion

Year	Federal RFD Coal Production Rate (MMst)[1]	CO_2 (metric tons)[2]				CH_4 (metric tons)[2]				N_2O (metric tons)[2]			
		Prod.	Trans.	Comb.	Total	Prod.	Trans.	Comb.	Total	Prod.	Trans.	Comb.	Total
2019	18.5	31,180	181,429	30,970,469	31,183,078	16,257	16	3,511	19,784	0.31	5.21	517	522.93
2020	25.4	42,925	276,088	42,635,429	42,954,441	22,381	24	3,511	25,916	0.43	7.93	712	720.64
2021	25.3	42,631	276,088	42,343,805	42,662,524	22,228	24	3,511	25,762	0.43	7.93	707	715.77
2022	24.6	41,505	276,088	41,225,913	41,543,506	21,641	24	3,511	25,176	0.42	7.93	689	697.08
2023	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2024	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2025	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2026	23.9	40,380	276,088	40,108,021	40,424,489	21,054	24	3,511	24,589	0.40	7.93	670	678.39
2027	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2028	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2029	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2030	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2031	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2032	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2033	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2034	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2035	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2036	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2037	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49
2038	21.6	36,465	244,535	36,219,701	36,500,701	19,013	21	3,511	22,545	0.36	7.02	605	612.49

[1] RFD=Reasonably Foreseeable Development; MMst: million short tons
[2] Prod=production; Trans=transportation; Comb=combustion

Table B-2
CO_2, CH_4, and N_2O Emissions from Federal Oil Production and Downstream Combustion

Year	Federal RFD Oil Production Rate (MMBO)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2020	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2021	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2022	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2023	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2024	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2025	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2026	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2027	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2028	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2029	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2030	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2031	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2032	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2033	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2034	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2035	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2036	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2037	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11
2038	3.0	54,951	130,537	185,488	268	52	321	0.57	10	11

[1] RFD=Reasonably Foreseeable Development; MMBO=million barrels of oil
[2] Totals may not sum exactly due to rounding

Table B-3
CO_2, CH_4, and N_2O Emissions from Federal Natural Gas Production and Downstream Combustion

Year	Federal RFD Natural Gas Production Rate (BCF)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2020	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2021	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2022	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2023	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2024	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2025	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2026	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2027	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2028	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2029	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2030	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2031	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2032	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2033	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2034	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2035	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2036	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2037	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1
2038	5.11	17,344	278,188	295,532	77	5.26	82	0.1	0.5	1

[1] BCF=billion cubic feet; Sum of conventional natural gas and coalbed natural gas
[2] Totals may not sum exactly due to rounding

Table B-4
CO_2, CH_4, and N_2O Emissions from Federal Coalbed Natural Gas Production and Downstream Combustion

Year	Federal RFD Natural Gas Production Rate (BCF)[1]	CO_2 (metric tons)			CH_4 (metric tons)			N_2O (metric tons)		
		Production	Combustion	Total[2]	Production	Combustion	Total[2]	Production	Combustion	Total[2]
2019	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2020	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2021	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2022	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2023	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2024	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2025	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2026	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2027	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2028	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2029	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2030	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2031	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2032	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2033	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2034	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2035	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2036	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2037	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1
2038	8.0	16,988	434,570	451,558	99	8.22	107	0.1	0.8	1

[1] BCF=billion cubic feet; Sum of conventional natural gas and coalbed natural gas
[2] Totals may not sum exactly due to rounding

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Appendix C

Coal Reasonably Foreseeable Development Scenario

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APPENDIX C
COAL REASONABLY FORESEEABLE DEVELOPMENT SCENARIO

C.1 INTRODUCTION

This reasonably foreseeable development (RFD) scenario describes anticipated coal resource development in the Miles City Field Office (MCFO) over the next 20 years, based on development trends and expected changes to those development trends. The geographic scope of this RFD is limited to coal resources within the decision area in the SEIS/RMPA.

Estimating the level of future coal development in the decision area has a high amount of uncertainty, because coal development depends on the continued operation of power plants, global coal markets, the ability to bring coal to market, and mining technologies. Energy policies can also shape demand by influencing the incentive and disincentives for coal development, and are often less foreseeable than the above-listed factors. Nevertheless, reasonable estimations of baseline future conditions can be forecasted based on existing mine operations, expected changes in power plant operations, and coal mines actively under planning. The RFD does not account for scenarios based on uncertain or speculative assumptions. Scenarios by alternative incorporate the land use allocations made under each alternative analyzed in the SEIS/RMPA.

The SEIS/RMPA decision area encompasses approximately 1,749,140 acres of federal mineral coal in the Power River and Williston Basins, overlapping 12 counties in eastern Montana. The decision area is 17 percent of the 10.6 million acres of subsurface minerals that the BLM administers across 17 counties in eastern Montana.

A US Geological Survey report determined that more than 162 billion short tons (BST) of available coal resources are within the Montana portion of the Powder River Basin, and approximately 35 BST were identified as recoverable by surface mining methods (Haacke et al. 2012).

The information included in this appendix was obtained from mine operators and BLM records.

C.2 EXISTING COAL MINING ACTIVITY

Federal coal is leased for four surface coal mines (Decker, Spring Creek Mine Complex, Savage, and Rosebud), covering approximately 34,700 acres in the decision area. There are no federal underground coal mining operations in the decision area. Leases for these mining activities are active until mined out, reclaimed, and then relinquished. Leases are typically held within a logical mining unit, allowing up to 40 years to complete production within the logical mining unit.

In addition to the federal coal mines, there is one nonfederal coal mine, the Absaloka Mine, and one forecasted nonfederal coal mine, Big Metal (discussed below).

C.3 NEW COAL MINING ACTIVITY

Production from a new domestic coal license is expected to occur over the life of the plan; however, annual production from the license is small relative to existing coal operations in the decision area (less than 20 tons per year). The license is not included in this RFD scenario because its order of magnitude is below the other four mines, and it would not meaningfully contribute to the analysis.

Cloud Peak Energy, owner of the Spring Creek Mine Complex (Spring Creek, Youngs Creek, and Big Metal), has indicated plans to develop coal on Crow Reservation lands. This coal development project—Big Metal—could initiate production sometime during the life of the plan. Coal production resulting from this project was included in this RFD scenario. This operation, however, would be a part of the Spring Creek Mine Complex. It would use the same outloading facilities and deliver to the same contracts; therefore, it would not represent an increase in production from what is expected for the Spring Creek Mine Complex.

C.4 FORECAST OF EXISTING MINING ACTIVITIES

New leasing is not forecasted to increase production from existing mines. Production is expected to continue under the scope of existing mine plans.

C.5 COAL PRODUCTION

C.5.1 Data Availability on Coal Production

There are four active federal and nonfederal mines in the Miles City SEIS/RMPA decision area and one nonfederal mine outside the decision area, but within the Miles City planning area. Three of these mines have provided the BLM with data on production. Two mines have not. The BLM used internal data to generate production forecasts into the future for the two mines that did not provide data, taking into consideration power station retirements. These forecasts predict that mines in the decision area would face difficulty securing the replacement of domestic supply coal contracts due to domestic energy production shifting toward natural gas and renewable energy sources.

The information disclosed in **Table C-1** and **Table C-2** reflects coal development totals, aggregating information from the BLM and commercial data.

C.5.2 Market Trends in Coal Production

Over the life of the SEIS/RMPA (20 years), the BLM expects coal production in domestic markets to decrease because of planned power station retirements. Among power plants

providing coal within the decision area, units 1 and 2 at Colstrip (Rosebud Mine), and the Lewis and Clark (Savage Mine) power plants have indicated that they will close in the next 3 years. Additional closures are likely to occur outside the planning area due to the change in market conditions; however, mines within the planning area are not the sole provider for these latter plants.

It should be noted that a significant percentage of coal is not combusted in the planning area and is shipped to foreign markets; this trend is anticipated to persist or increase throughout the duration of the plan. Global market demand and the associated demand on the export of coal are expected to increase over this time horizon, following existing trends and with no foreseeable countervailing influence. The net outcome of this on coal in the decision area is uncertain.

Two of the five existing mines in the Miles City planning area export coal to global markets. The three existing mines that do not export coal do not meet coal quality requirements for export coal supply contracts; therefore, global market demand would not influence them in the same way.

C.5.3 Coal Production

About 38.7 million tons of coal will be mined from the decision area each year, totaling 775 million tons of coal over the life of the SEIS/RMPA and affecting approximately 9,730 acres (based on current lease applications). Of the total forecasted production (approximately 775 million tons), it is anticipated that approximately 58 percent (450 million tons) would be federal coal, based on production between 2016 and 2018. The forecasted disturbance of land attributed to the mining of federal coal would be proportional (5,640 acres).

C.6 FORECASTED COAL PRODUCTION BY YEAR, OWNERSHIP, AND LEASE AVAILABILITY

Table C-1
Forecasted Coal Production in the MCFO SEIS/RMPA Decision Area 2019–2038

Year	Total Production (million tons)	Federal Production (million tons)	Nonfederal Production (million tons)
2019	31.86	18.5	13.4
2020	43.86	25.4	18.4
2021	43.56	25.3	18.3
2022	42.41	24.6	17.8
2023	41.26	23.9	17.3
2024	41.26	23.9	17.3
2025	41.26	23.9	17.3
2026	41.26	23.9	17.3
2027	37.26	21.6	15.6
2028	37.26	21.6	15.6
2029	37.26	21.6	15.6
2030	37.26	21.6	15.6

Year	Total Production (million tons)	Federal Production (million tons)	Nonfederal Production (million tons)
2031	37.26	21.6	15.6
2032	37.26	21.6	15.6
2033	37.26	21.6	15.6
2034	37.26	21.6	15.6
2035	37.26	21.6	15.6
2036	37.26	21.6	15.6
2037	37.26	21.6	15.6
2038	37.26	21.6	15.6
Total[1]	**775**	**450**	**325**

[1] Rounded for clarity (unrounded values: 773.8, 448.8, 325.0)

Table C-2
Disposition of Coal Resources in the MCFO SEIS/RMPA Decision Area 2019–2038

Leasing Disposition / Status		Coal (million short tons)
Disposition Type	Federal Leased	377
	Nonfederal Leased[1]	198
	Nonfederal Leased (not permitted)[1, 2]	152
	TOTAL	**727**
Status of Leasing	Pending Federal Lease Sale	405
	Nonfederal Unleased[3]	1,800
	TOTAL	**2,205**

[1] American Indian coal resources are classified under nonfederal coal resources.
[2] Lands are leased for coal mining, but necessary permits for operations have not been obtained.
[3] This represents coal that the mining companies have expressed interest in mining on nonfederal land during the life of the plan.

C.7 REFERENCES

Haacke, J. E., D. C. Scott, L. M. Osmonson, J. A. Luppens, P. E. Pierce, and J. A. Gunderson. 2012. Assessment of Coal Geology, Resources, and Reserves in the Montana Powder River Basin. Publications of the US Geological Survey. 119. Internet website: http://digitalcommons.unl.edu/usgspubs/119.

Appendix D

Coal Market Supplementary Report

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
ACR	Annual Coal Report
AEO	Annual Energy Outlook
BEA	US Bureau of Economic Analysis
BP	British Petroleum
BGR	Federal Institute of Geosciences and Natural Resources
BLM	US Department of the Interior, Bureau of Land Management
EIA	Energy Information Administration, US Department of Energy
IEA	Institute for Energy Information
PRB	Powder River Basin
MCFO	Bureau of Land Management, Miles City Field Office
MSHA	US Mine Safety and Health Administration
MMBtu	million British thermal units
Mt	million tons
RFD	reasonably foreseeable development
RMP	resource management plan
RMPA	resource management plan amendment
SEIS	supplemental environmental impact statement
US	United States
WCR	Western coal region

APPENDIX D
COAL MARKET SUPPLEMENTARY REPORT

D.1 INTRODUCTION

The Bureau of Land Management (BLM) Miles City Field Office (MCFO) in Montana has been court ordered to fulfill a supplemental environmental impact statement/resource management plan amendment (SEIS/RMPA) in support of the 2015 Proposed RMP/Final EIS submitted by the BLM MCFO. The BLM wrote this appendix in support of **Section 3.9**, Economic Considerations, of the 2019 SEIS/RMPA. The appendix further describes the clarifications the BLM has made to address the projections of coal production in the context of the fuel generation energy mix in the electric utility market and fuel substitution elasticities, with an emphasis on coal and natural gas supply, demand, and price structures. This analysis utilizes data from the Energy Information Administration (EIA), International Energy Agency (IEA), Mine Safety and Health Administration (MSHA), and other resources that analyze domestic and global markets.

Economic considerations disclosed in the SEIS/RMPA are a result of the BLM updating the reasonably foreseeable development (RFD) scenario in response to the need to update the coal screening analysis. Based on information gathered from existing mining operations in the MCFO and associated mine permits received, the BLM updated the RFD scenario from what was considered in the 2015 Proposed RMP/Final EIS. Because of this, there is an updated economic forecast from what was disclosed in the 2015 Proposed RMP/Final EIS.

The economic forecast depends on coal market conditions, both domestically and globally. This supplemental appendix summarizes the current conditions of the United States (US) domestic energy market and the global energy market in the context of coal produced within the MCFO.

D.2 ECONOMIC ANALYSIS AREA

The economic analysis area contains coal production occurring in the Western coal region (WCR) of the United States. The WCR contains the Powder River Basin (PRB), which produces approximately 43 percent of total US coal. Because of the large proportion of coal that the PRB produces, data sources, such as the EIA and MSHA, typically report production data for the WCR in two subregions: the PRB and the remainder of the WCR. Mines located within the MCFO produce coal in both subregions.

Numerous factors influence fuel substitution elasticity and market shares in the fuel generation energy mix, including prices, fuel costs, mining methods, transportation costs, investment, and environmental constraints (Elbakidze and Zaynutdinova 2016; Stephens et al. 1979; BLM 2018). In order to understand the changes in domestic and global markets, given the difficulty in analyzing the various market factors, this appendix pulls analysis from the Annual Energy Outlook (AEO) (EIA 2019a) and other reports from the EIA to best understand US domestic markets. To best understand global markets, this appendix pulls analysis from reports written by the IEA, Federal Institute of Geosciences and Natural Resources (BGR) from Germany, and analysis from global energy market economists.

D.2.1 Miles City Field Office – Montana

The RMP this supplementary report assists specifically analyzes the economic effects associated with BLM-forecasted coal production in Big Horn, Rosebud, and Richland Counties within the jurisdiction of the BLM MCFO. In addition, Yellowstone County is included in this analysis per Montana intercounty commuting patterns for regional coal employment. Production in the socioeconomic analysis area is surface coal. Production within the MCFO primarily occurs within the PRB, but also has production in the WCR. Local mine forecasts, optimistic toward the US coal export market, drive production forecasts for the MCFO.

D.3 HISTORICAL DOMESTIC PRODUCTION AND EMPLOYMENT

The US holds the largest single-region coal reserves in the world, accounting for approximately 30 percent of global reserves. National production has maintained at around 1 billion million short tons (MMst) per year from 1990 until 2015 (Hook and Aleklett 2009; CRS 2017; BGR 2017). US coal reserves are concentrated to three regions, the Appalachian coal region, Interior coal region, and the Western coal region, with each region containing coal producing basins (EIA 2018a).

The Appalachian coal region consists of Alabama, eastern Kentucky, Maryland, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The EIA and MSHA primarily report coal production and employment data from the northern Appalachian basin, the central Appalachian basin, and the southern Appalachian Basin (MSHA 2018). In 2017, the Appalachian coal region produced 26 percent of total US coal production (EIA 2018a).

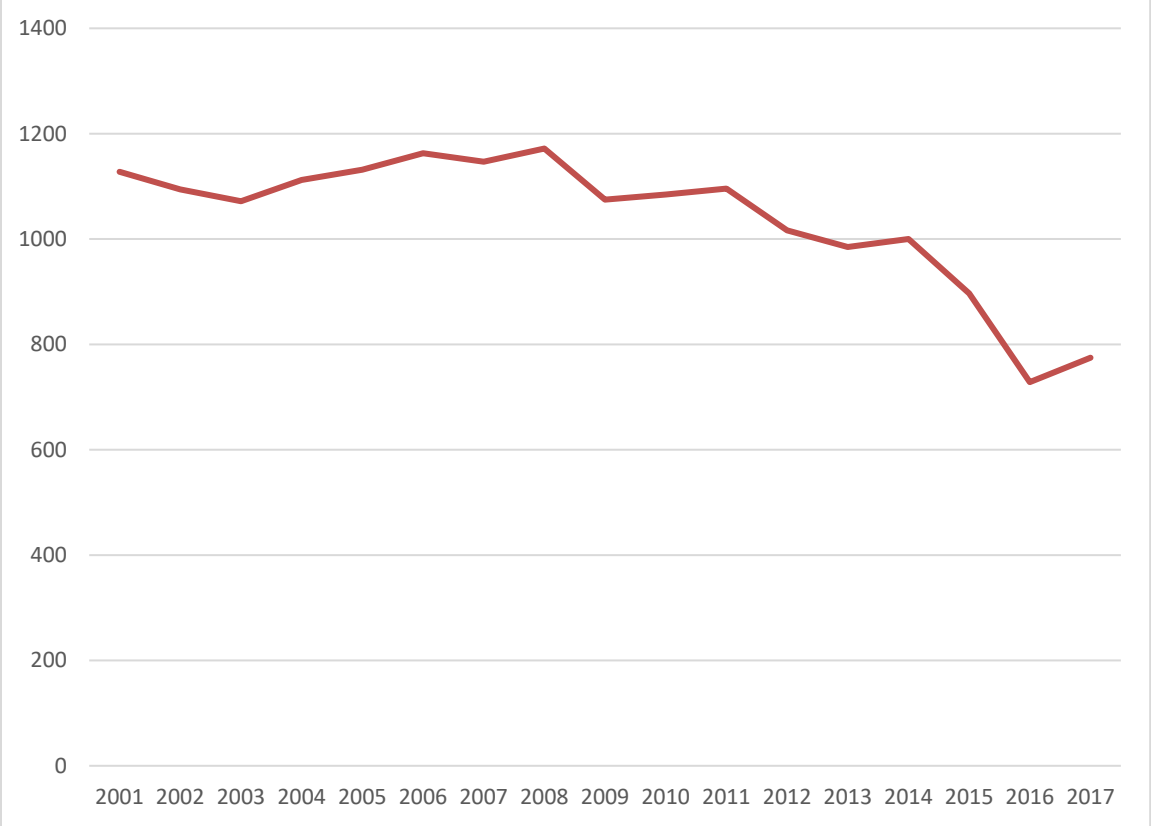
The Interior coal region contains Arkansas, Illinois, Indiana, Kansas, Louisiana, Mississippi, Missouri, Oklahoma, Texas, and west Kentucky. Because Illinois produces 33 percent of coal in the Interior coal region, the EIA and MSHA report coal production and employment data for the Illinois coal basin and the remainder of the Interior coal region separately (EIA 2018a; MSHA 2018; EIA 2018c). In 2017, the Interior coal region produced approximately 19 percent of total US coal production (EIA 2018a).

The Western coal region contains Alaska, Arizona, Colorado, Montana, New Mexico, North Dakota, Utah, Washington, and Wyoming. The PRB, within the Western coal region, is the largest coal producing area in the US, accounting for approximately 43 percent of total US coal production (MSHA 2018; EIA 2018a). The EIA and MSHA report coal production and employment data for the PRB and the remainder of the WCR separately (MSHA 2018). In 2017, the WCR produced 56 percent of total coal production in the US (EIA 2018a).

US Production

Coal production had been above 1,000 MMst prior to 2014, with production reaching its peak in 2008, before declining in recent years. In 2001, coal production was approximately 1,090 MMst, while in 2017, production was approximately 775 MMst (MSHA 2018).[1] Coal production was relatively stable from 2001 through 2008, maintaining levels between 1,100 MMst and 1,200 MMst. Production began to decline between 2008 to 2014, from 1,172 MMst to 1,000 MMst. Significant declines did not begin until after 2014, where production fell to 897 MMst in 2014, 728 MMst in 2016, and 775 MMst in 2017. Changes were primarily driven by market factors, which will be described in further detail in **Section D.3** of this report. **Diagram D-1**, below, describes the long-run trend of domestic US coal production.

Diagram D-1
Historical US Production 2001–2017 (Million Short Tons)



Between 2001 and 2008, the average annual rate of change in production was approximately 0.6 percent. Between 2008 and 2014, the average annual rate of change in production was approximately -1.8 percent, marginally lower than those between 2001 and 2008. Major declines in coal production within the MCFO occurred between 2014 and 2017, where the average

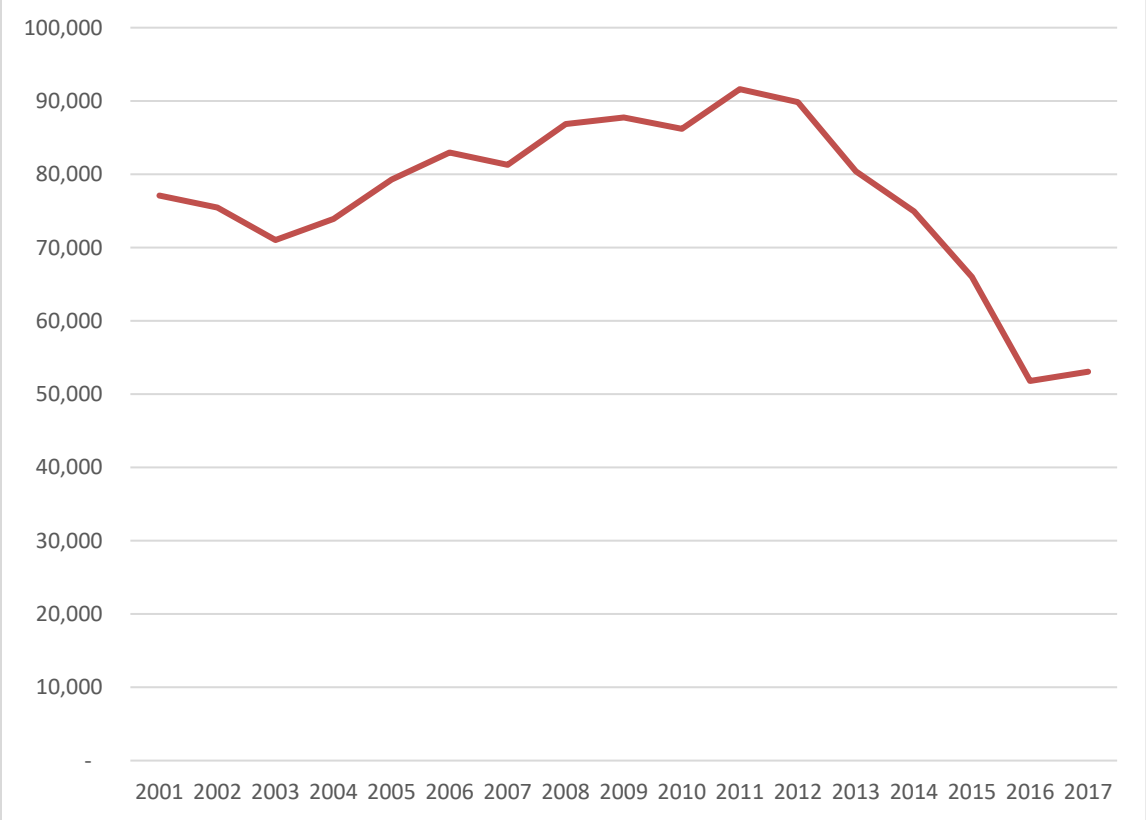
[1] The MSHA provides coal production levels from 1997 to 2017; however, the MSHA did not collect coal employment data until 2001. To maintain consistency between production and employment, this analysis uses 2001–2017 MSHA data for production.

annual rate of change in production was approximately -5.3 percent. For the full 16-year period, the average annual rate of change was approximately -2.1 percent (MSHA 2018).

US Employment

US coal employment levels had been steadily increasing between 2001 and 2011, before declining between 2011 and 2016. The US coal industry saw growth in employment levels from 2016 to 2017. In 2001, approximately 77,088 persons were employed in the coal industry. Employment marginally declined from 2001 to 2003, where employment levels were at approximately 71,023 persons. Employment grew, however, from 2003 through its peak in 2011, where employment reached 91,611 persons. Employment levels began to decline following 2011 through 2017, where employment was at approximately 53,051 persons (MSHA 2018). **Diagram D-2**, below, visualizes the change in employment levels.

Diagram D-2
Historical US Coal Employment 2001–2017 (Annual Average Employment)



Between 2001 and 2008, the average annual rate of change in employment was approximately 1.8 percent. Between 2008 and 2014, the average annual rate of change in employment was approximately -1.0 percent, mostly due to declines in employment experienced by the industry following 2011. Between 2014 and 2017, the average annual rate of change in employment was approximately -9.5 percent. For the full 16-year period, the average annual rate of change was approximately -2.0 percent (MSHA 2018).

D.3.1 Miles City Field Office

Montana is part of the WCR, the largest coal producing region in the US. In 2017, the WCR produced a total of 431 MMst, accounting for approximately 56 percent of total US coal production (MSHA 2018). The PRB, within the WCR, produced 334 MMst, accounting for approximately 77.5 percent of total coal production in the WCR and 43.1 percent of total coal production in the US (MSHA 2018; EIA 2018a). Given the proportion of production occurring in the PRB, the EIA and MSHA report coal production and employment data for the PRB and the remainder of the WCR separately (MSHA 2018). While Montana coal production primarily occurs within the PRB, coal production also occurs in areas defined by the EIA and MSHA as separate from the PRB but within the WCR (MSHA 2018).

Within the WCR, the PRB produced 334 MMst of surface coal out of 16 mines; the remainder of the WCR produced 68 MMst of surface and underground coal, accounting for 8.8 percent of total US coal, out of 20 mines (MSHA 2018).

In 2017, Montana was the sixth-highest coal producer in the US, with approximately 35 MMst mined within the state (EIA 2018c; MSHA 2018). Historically, the Montana coal industry has been an important economic driver for the state, accounting for a total employment contribution of 6,588 jobs and generating approximately $774 million in total contributions to state gross domestic product in 2015 (National Mining Association 2016). Coal production in Montana also contributes to the Montana Coal Severance Tax Trust Fund, which supports a variety of public infrastructure projects throughout the state (Montana Department of Commerce 2017; Montana Legislative Fiscal Division 2015).

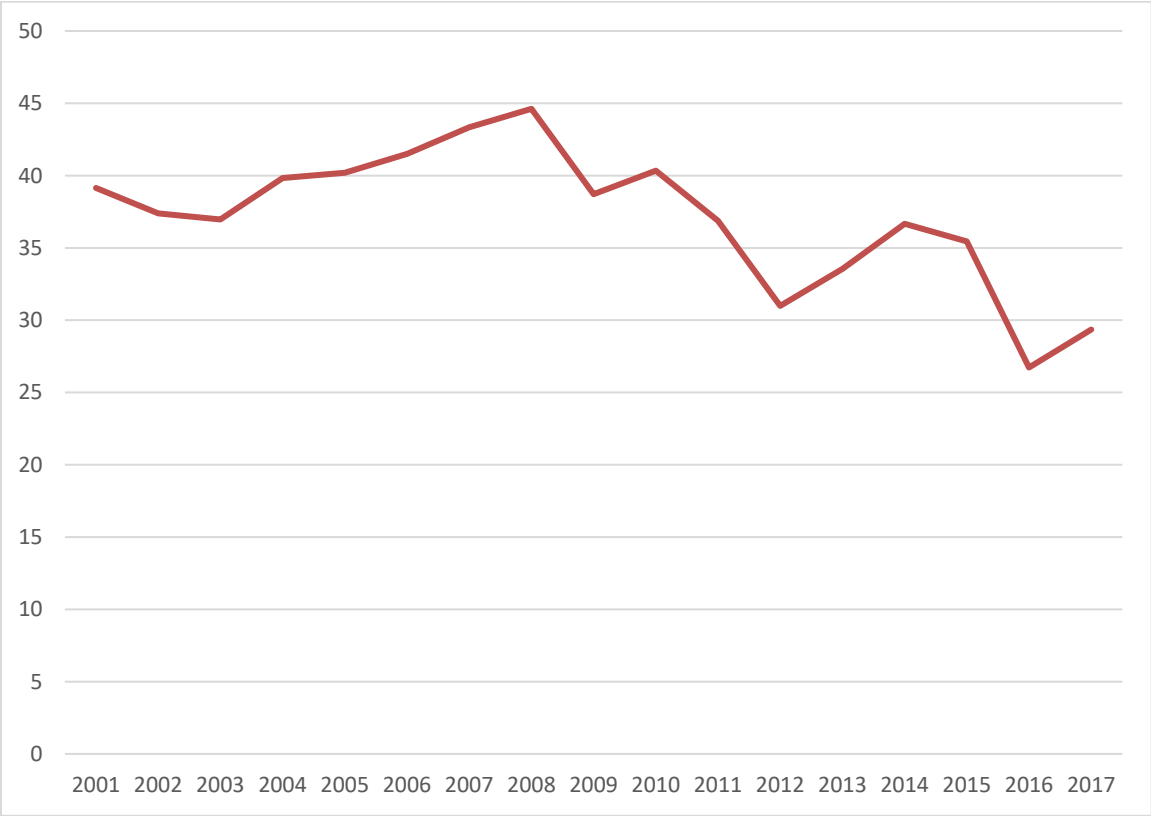
Recoverable reserves present the forecasted amount of coal that can be potentially recovered. In 2017, Montana had approximately 779 short tons of recoverable reserves, accounting for 4.8 percent of total US reserves, as reported by mines producing more than 25,000 short tons to the EIA (EIA 2018c). Given the percentage of coal production that occurs on federal mineral estate (58 percent) within the socioeconomic decision area, it is reasonable to believe that the majority of these recoverable reserves also exist in this area.

Capacity utilization rates represent the ratio of annual coal produced to annual productive capacity; they and help identify the operating rate of a coal mine. They identify the proportion of output realized given the constraints to mine inputs. In 2017, Montana's capacity utilization rate for surface coal production was 70.2 percent, which is higher than the US rate of 69.9 percent (EIA 2018c).

Miles City Field Office Production

Mines that produce coal within the MCFO are located in Big Horn, Rosebud, and Richland Counties. Coal production within the MCFO had been steadily increasing prior to 2008, increasing from 39 MMst in 2001 to 45 MMst in 2008. Production began to fall following 2008, from 39 MMst in 2009 to 31 MMst in 2012. There was a slight increase in production following 2012, with production increasing to 37 MMst in 2014; however, declines began again following 2014, to 35 MMst in 2015 and 27 MMst in 2016. There was a slight increase in production from 2016 to 29 MMst in 2017 (MSHA 2018). **Diagram D-3**, below, visualizes the data.

Diagram D-3
MCFO Historical Production 2001-2017 (Million Short Tons)



Between 2001 and 2008, the average annual rate of change in production was approximately 2.0 percent. Between 2008 and 2014, the average annual rate of change in production was approximately -1.9 percent, driven primarily by declines immediately following 2008. Between 2014 and 2017, the average annual rate of change in production fell to -2.2 percent. For the 16-year period between 2001 and 2017, the average annual rate of change was approximately -1.3 percent (MSHA 2018).

Coal production within the MCFO occurs in Big Horn, Rosebud, and Richland Counties on five mines. Big Horn County contains the Decker Mine, Absaloka Mine, and the Spring Creek Mine Complex; Rosebud County contains the Rosebud Mine & Crusher/Conveyer; and Richland County contains the Savage Mine.

In 2017, the Spring Creek Mine Complex produced the most coal in the planning area, accounting for approximately 12.7 MMst, or 43.3 percent of the socioeconomic analysis area total (MSHA 2018). **Table D-1** presents 2017 coal production by mine.

Table D-1
Socioeconomic Analysis Area Production by Mine, 2017

Mine Name	County	2017 Coal Production (MMst)
Decker Mine	Big Horn	4.2
Absaloka Mine	Big Horn	3.6
Spring Creek Mine Complex	Big Horn	12.7
Savage Mine	Richland	0.3
Rosebud Mine & Crusher/Conveyer	Rosebud	8.6
Planning Area Total	**-**	**29.3**

Source: MSHA 2018

Miles City Field Office Employment

Coal industry employment trends within the MCFO varied from production trends during the 16-year period. Industry employment initially fell from 843 persons in 2001 to 683 persons in 2004. Following 2004, the coal industry in the MCFO experienced increases in employment through 2008, from 782 in 2005 to 990 in 2008. Coal employment remained relatively stable following 2008 through 2011, where employment remained above 950 persons. In 2012 and 2013, employment fell to 913 and 914, respectively; however, in 2014 and 2015, coal employment in the MCFO reached its highest levels in the 16-year period, with 996 and 1,017, respectively. Following 2015, coal employment in the region began to decline to 920 in 2016 and 894 in 2017 (MSHA 2018). See **Diagram D-4**.

Between 2001 and 2008, the average annual rate of change in coal employment was approximately 2.7 percent. Between 2008 and 2014, the average annual rate of change in employment fell to approximately 0.5 percent. Between 2014 and 2017, the first time the region experienced annual average declines, the average annual rate of change in employment was approximately -0.3 percent. For the 16-year period between 2001 and 2017, the average annual rate of change in employment was approximately 0.6 percent (MSHA 2018).

Employment levels varied across mines and counties in the socioeconomic analysis area. In 2017, a total of 894 were employed in the socioeconomic analysis area (MSHA 2018). The Rosebud Mine & Crusher/Conveyer, located in Rosebud County, represented the majority of coal employment, accounting for 36.6 percent of coal employment in the socioeconomic analysis area (MSHA 2018). At the county level, Big Horn County held 553 coal jobs, Rosebud held 327 coal jobs, and Richland County held 14 coal jobs (MSHA 2018). See **Table D-2** for more information on employment distribution.

Coal employment data identify the relative intensity of the coal industry to total employment. In 2017, Big Horn County had the highest percentage of coal employment relative to total employment at 9.4 percent, while Richland County had the lowest at 0.16 percent of total employment in the coal industry (MSHA 2018; BEA 2019). For comparison, Montana had 0.17 percent of total employment in the coal industry, while the United States had 0.027 percent of the employed labor force in the coal industry (EIA 2018c; BEA 2019). While coal employment may not provide major employment contributions to state or national totals, they do provide a larger contribution to the counties within the socioeconomic area of analysis. See **Table D-3**, below, for more detailed information on coal employment numbers.

Diagram D-4
MCFO Historical Employment 2001–2017 (Annual Average Employment)

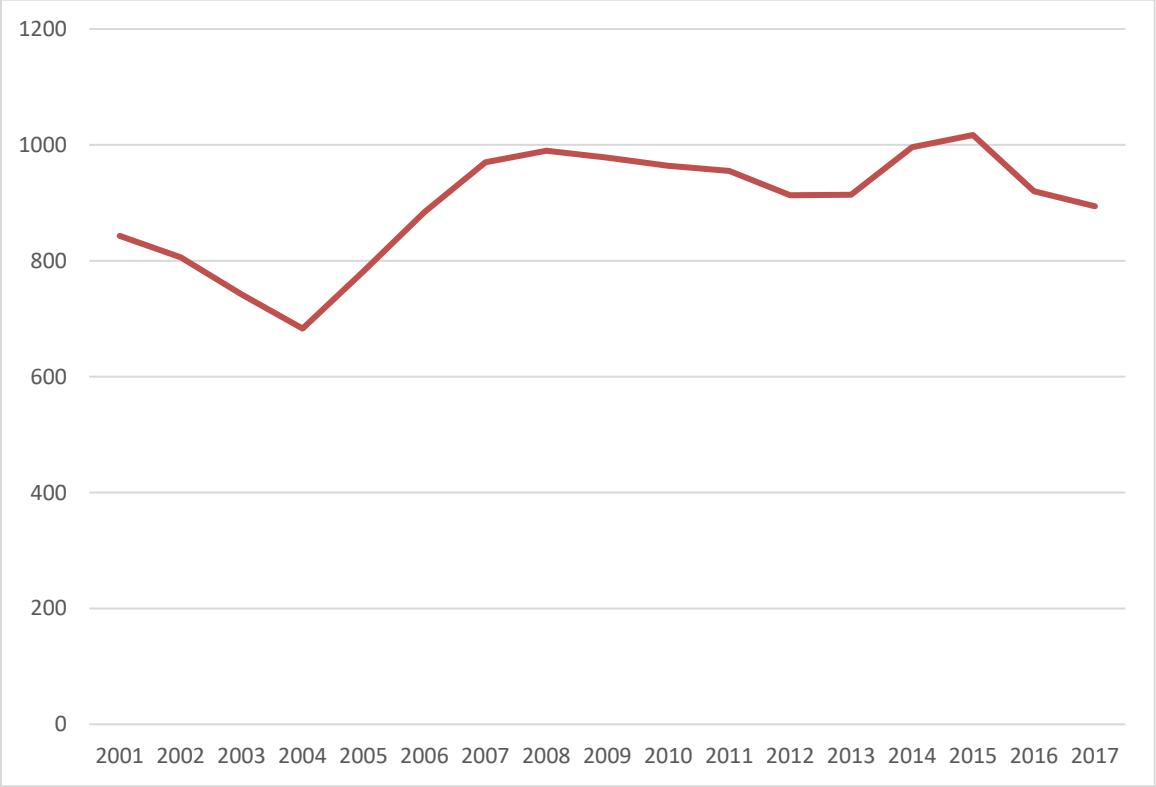


Table D-2
Socioeconomic Analysis Area Employment by Mine, 2017

Mine Name	County	Average Annual Employment
Decker Mine	Big Horn	153
Absaloka Mine	Big Horn	139
Spring Creek Mine Complex	Big Horn	261
Savage Mine	Richland	14
Rosebud Mine & Crusher/Conveyer	Rosebud	327
Planning Area Total	**-**	**894**

Source: MSHA 2018

Table D-3
Socioeconomic Analysis Area Coal Employment Ratio, 2017

County	Coal Employment	Total Employment	Percentage Coal Employment
Big Horn	553	5,859	9.44
Richland	14	8,397	0.16
Rosebud	327	5,580	5.86

Source: MSHA 2018; BEA 2019; EIA 2018c

Location quotients identify the concentration of a particular industry in a specified region compared with a larger reference region. They determine which industries make a region unique, while also identifying regional export characteristics. Values of location quotients are calculated by comparing an industry's share of regional employment against the same industry's share of national employment; they can be interpreted as the number of times more concentrated an industry is in a specified region compared with a larger reference region (Sentz 2011). In 2017, the coal industry in Big Horn County was almost 56 times more concentrated than the state of Montana, and over 349 times more concentrated than the United States. See **Table D-4**, below, for more information.

Table D-4
Socioeconomic Analysis Area Coal Location Quotient, 2017

County	Location Quotient to MT	Location Quotient to US
Big Horn	55.5	349.63
Richland	0.94	5.93
Rosebud	34.5	217.04
Montana	X	6.29

Source: MSHA 2018; BEA 2019; EIA 2018c

D.4 MARKET TRENDS

This supplementary appendix analyzes trends in the US energy market and the global coal market. In general, coal production in the domestic US market is expected to decrease. This is due to retirements of less economic coal power stations driven by the abundance and lower prices of US natural gas. While global coal demand is expected to increase, driven primarily by coal power generation in China and India, US exports are not expected to increase due to competition from suppliers closer to those markets (IEA 2019; EIA 2019a).

Forecasted reductions in coal demand for the fuel generation energy mix has the potential to reduce coal production in the socioeconomic analysis area. Reductions in coal production would result from the coal mines' inability to compete for future supply contracts.

While the US coal market share is not expected to increase over the 20-year planning horizon of the SEIS/RMPA, the Decker Mine and Spring Creek Mine Complex are projecting increases in exported coal for the socioeconomic analysis area. Export-driven coal production would rely on regional competitiveness compared with global suppliers closer to major global coal consumers, such as China and India. The economic viability of export-driven coal production is also dependent on other factors outside BLM management decisions, such as exchange rates, trade barriers, and changes in transportation costs.

D.4.1 US Domestic Market

This section incorporates by reference Chapter 4 of the Wright Area Remand Environmental Assessment and is summarized below (BLM 2018).

The AEO uses the National Energy Modeling System (NEMS) to forecast energy supply, demand, and prices approximately 30 years into the future (EIA 2019a; EIA 2019b). National aggregation of economic factors related to energy is not sufficient to account for the physical and economic

characteristics unique to geographical regions (Stevens et al. 1979); the NEMS analyzes energy characteristics at a regional level to account for these differences (EIA 2019a). To account for the uncertainty inherent to energy markets, the NEMS uses a reference case and six side cases (high/low oil price, high/low oil and gas resource and technology, and high/low economic growth).

In 2018, the AEO 2019 found that coal accounts for approximately 28 percent of US electric generation, while natural gas accounts for approximately 34 percent (EIA 2019a). The share of coal in the US fuel generation energy mix is expected to decline in all cases from 2018 through 2050, driven primarily by the lower natural gas prices and declining costs of renewable energy. Coal is expected to decline from 28 percent in 2018 to 17 percent in 2050; renewables are expected to grow from 18 percent in 2018 to 31 percent in 2050; natural gas is expected to rise from 34 percent in 2018 to 39 percent in 2050, with natural gas retaining the dominant market share of electricity generation (EIA 2019a).

The decline in natural gas prices has decreased the competitiveness of coal and is projected to lead to the continued dominance of natural gas in the fuel generation energy mix through 2050. The average costs of coal and natural gas have experienced some volatility between 2008 and 2017, primarily due to the instability of markets following the 2008–2009 recession (EIA 2018b). Coal experienced increases in average cost (dollars per MMBtu) from 2008 to 2011, while natural gas saw a decline over the same period (EIA 2018b). Average annual growth rates for coal from 2008 through 2017 was 1.7 percent, while average annual growth rates for natural gas were -3.5 percent (EIA 2018b). **Table D-5** describes the average costs of coal and natural gas, coupled with annual growth rates.

Table D-5
Average Cost of Coal and Natural Gas 2007–2017

Period	Coal Average Cost ($ per MMBtu)	Coal Annual Growth Rate (percent)	Natural Gas Average Cost ($ per MMBtu)	Natural Gas Annual Growth Rate (percent)
2007	1.77	-	7.11	-
2008	2.07	16.9	9.02	26.9
2009	2.21	6.8	4.74	-47.5
2010	2.27	2.7	5.09	7.4
2011	2.39	5.3	4.72	-7.3
2012	2.38	-0.4	3.42	-27.5
2013	2.34	-1.7	4.33	26.6
2014	2.37	1.3	5.00	15.5
2015	2.22	-6.3	3.23	-35.4
2016	2.11	-5.0	2.87	-11.1
2017	2.06	-2.4	3.37	17.4

Source: EIA 2018b

The reduced competitiveness of coal-fired energy generation is projected to lead to the retirements of inefficient coal-fired power plants through 2025 (EIA 2019a). Previous studies have found that coal and natural gas are substitutes in all US states from 2009 through 2014 with positive cross-price elasticities; however, states that are heavily reliant on coal have a

limited ability to switch away due to the inelasticity of substitution in electricity generation, as power plants are generally designed to operate on a particular fuel source (Elbakidze and Zaynutdinova 2016; BLM 2018). The investment and development of combined-cycle natural gas power generators also influence retirements of inefficient coal-fired power plants (EIA 2019a).

The projected lower energy demand of coal, coupled with the retirement of inefficient coal-fired power plants, is expected to result in the reductions of US coal production. AEO 2019 projects domestic coal production to decrease between 2018 and 2035, from 762 million short tons in 2018 to 608 million short tons in 2035, before stabilizing at around 600 million short tons through the remainder of the analysis period in 2050 (EIA 2019a). Coal production in the WCR is projected to decline by 85 million short tons between 2018 and 2035 (EIA 2019a). The decline in US coal production is driven by the competitive price and reduced costs of natural gas.

Fuel Substitution

This section incorporates by reference the Fuel Substitution and Coal Prices section of Chapter 4 of the Wright Area Remand Environmental Assessment and is summarized below (BLM 2018).

Historically, US coal has dominated the domestic electric fuel generation energy mix due to its relatively low prices compared with other sources. The WCR has provided the lowest prices in the US due to PRB coal, which has a lower heating value and can be mined from the surface relatively inexpensively; thus, it commands a lower price than coal from other coal producing regions. Coal produced from the PRB has been primarily used to support US electric demand, and natural gas has been unable to compete in the past due to relatively higher prices.

However, recent price trends have led to the declined use of coal and increased use of natural gas. Coal has been found to be the most price inelastic energy source in the energy mix, as consumer demand does not respond drastically to changes in coal prices (Gao et al. 2013; Elbakidze and Zaynutdinova 2016). This is partially due to power generation plants being built to support a specific energy source and the relative expensiveness of other energy alternatives. Recent declines in natural gas prices, however, have led to increasingly positive elasticities of substitution between the two fossil fuels (Gao et al. 2013; Elbakidze and Zaynutdinova 2016; EIA 2018b; EIA 2012). An EIA study found that a 10 percent increase in the price of coal relative to natural gas led to a 1.4 percent increase in natural gas usage with respect to coal usage (EIA 2012).

Despite the substitutability of natural gas and coal, other factors play roles in the fuel generation energy mix. The electricity market is subject to numerous factors, including the development of technology, environmental regulations, and the economic feasibility of alternate resources. While natural gas has the highest cross-price elasticity with coal, other energy sources, such as renewables, may become more feasible in the future; however, these are extremely difficult to predict.

D.4.2 US Export Market and Global Market Demand

Global market demand is expected to increase over the next 20 years, driven by coal-powered generation in China and India; however, US exports are expected to remain stable (IEA 2019; AEO 2018).

In 2017, global coal consumption increased for the first time in 4 years, driven by population growth and market demand in the Asia Pacific region. Global coal consumption increased by 1 percent in 2017, the first positive change in coal consumption since 2013, driven by consumption in India, which grew by 25 MMst, and China, which grew by 6 MMst (BP 2018). Global coal production also increased in 2017 by approximately 3.2 percent from 2016 levels. This was led by China and the US, which increased production by 80 MMst and 33 MMst, respectively (BP 2018).

Coal remains the most abundant of available world energy resources. It accounts for approximately 89.1 percent, while natural gas, the dominant US domestic alternative to coal, is the second-most abundant resource at 5.8 percent (BGR 2017). Given the type and quality of US coal, US exports are primarily used to support the global power generation as the dominant portion of the global fuel generation energy mix.[2] The coal proportion of the global fuel generation energy mix has remained relatively stable since 1997, with coal accounting for 38 percent in 1998 and 38 percent in 2017 (Spencer 2018).

Global coal production increases are mainly due to domestic policy in major coal consuming countries. In 2016, the largest coal producers were China, India, and the United States; however, India was the only country to boost production from 2015 levels, approximately 3.7 percent. China and the US both saw declines of 9.4 percent and 20.6 percent, respectively, over the same time frame (BGR 2017). Approximately 1,445 MMst, or 20 percent of produced coal, was traded in global markets, with 1,248 MMst, or 86.4 percent of traded coal, transported by sea (BGR 2017).

The Asia Pacific region drives both supply and demand for the global coal market. In 2017, Asia Pacific had the most proven coal reserves, accounting for approximately 41 percent of the global total located primarily within Australia, China, and India (Spencer 2018). Asia Pacific drives coal consumption, primarily in China, consuming 2,119 MMst or 50.7 percent of the global share, and India, consuming 475 MMst or 11.4 percent of the global share (IEA 2019; BP 2018).

As such, the Asia Pacific region also drives the import/export market. The top coal importers in 2016 were China at 287 MMst, India at 214 MMst, and Japan at 213 MMst. The top exporters were Australia at 439 MMst, Indonesia at 414 MMst, and Russia at 186 MMst (BGR 2017).

Global markets are difficult to predict. This is because the factors that affect domestic market demand, as described in **Section D.3**, also occur in the global market, but they are coupled with trade barriers, transportation costs, and relative intensity of exchange rates.

[2] The fuel generation energy mix is the category of energy sources used for energy generation

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